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A Preliminary Analysis of the Impact of a Ukraine-EU Free Trade Agreement on Agriculture

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Abstract

Agriculture including food products is of particular interest for Ukraine. However, in free trade agreements involving the European Union, agriculture is always given special treatment and subject to less and slower liberalization than other sectors. This paper employs the standard Global Trade Analysis Project model in order to assess how World Trade Organization accession affects agriculture in Ukraine, and how potential bilateral tariff cuts may interact with potential productivity gains within Ukrainian agriculture. The results indicate that, due to trade liberalization, Ukraine can expect gains from a more efficient allocation of its resources in line with comparative advantage, leading to an increase of production and exports of wheat, other grains, and oilseeds, but also of several processed food products that benefit from less expensive intermediate inputs. However, Ukraine's exports are concentrated on a small number of destinations, especially Russia and some other Former Soviet Union countries because they fail to meet quality standards elsewhere. When Ukrainian production of these products increases due to increased allocative efficiency, exports to Russia increase further and prices there fall, generating negative terms of trade effects that largely offset the allocative gains. Ukrainian imports of agricultural products increase as well, partly because Ukrainian consumers switch to higher quality imported goods even though domestic production increases. Regarding free trade agreement negotiations with the European Union, these results highlight for Ukraine the fact that improved agricultural productivity will help to get most out of improved market access. However, the results also highlight for Ukraine the great importance of adopting internationally accepted quality standards in order to diversify its export structure.

This paper—a product of the Agriculture and Rural Development Team, Development Research Group; and Europe and Central Asia Region—is part of a larger effort by the Bank to support Ukraine's further regional and global economic integration. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at scramon@gwdg.de.

A Preliminary Analysis of the Impact of a Ukraine-EU Free Trade Agreement on Agriculture

Stephan von Cramon-Taubadel*, Sebastian Hess** and Bernhard Brümmer*

This paper disseminates the findings of work in progress to encourage the exchange of ideas about trade related issues. This work was undertaken as a preparatory stage in the context of the Bank's support to the FTA negotiations between Ukraine and EU at the request of the Ukrainian government. It was funded by The Europe and Central Asia Region of The World Bank. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.

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Context and Acknowledgements

This work was prepared in the course of a dialog with agricultural policy makers in Ukraine who are involved in the free trade agreement (FAT) negotiation process with the EU. The purpose of this paper is to support the FTA negotiations through identification of key issues for the Ukrainian policy makers who will be involved in FTA negotiations with the EU.

Following this Preface and an Executive Summary in chapter I, this paper comprises four chapters. Chapter II presents background information on FTAs in general and a qualitative look at some FTAs that the EU has negotiated with other countries. This overview provides insights into the strategies that the EU is likely to pursue in FTA negotiations with Ukraine. One key result is that agriculture always receives special treatment in the form of less ambitious and less rapid liberalization of trade in FTAs involving the EU. Another important fact is that the EU applies a wide range of stringent quality standards to agricultural raw materials and processed food products. Policy makers in the EU are especially sensitive to food safety issues, and the EU cannot be expected to negotiate any relaxation of its quality standards with Ukraine.

Chapter III provides an introduction to trade policy modeling in general, and the Global Trade Analysis Project (GTAP) model in particular. The GTAP model is used in subsequent chapters to provide quantitative assessments of Ukrainian agricultural trade policy options. GTAP is a state-of-the-art computable general equilibrium (CGE) simulation model that is linked to an up-to-date trade database that, in its most recent version (GTAP-7), includes Ukraine as a separate country for the first time. GTAP distinguishes between 57 products/sectors, including 20 agricultural and food products. This is a considerably higher level of agricultural disaggregation than is commonly available in CGE models. Hence, GTAP is well-suited to the task of providing numerical assessments of the impact on agriculture of an FTA between the Ukraine and the EU.

Chapter IV presents the results of simulations of the impact of highly stylized Ukraine/EU FTA scenarios. The results of this pilot study indicate that both Ukraine and the EU would benefit from an FTA, and they highlight the importance of improving the productivity of Ukrainian agriculture so that Ukraine is able to draw the greatest possible benefit from the opportunities provided by increased access to EU markets.

On May 16, 2008, Ukraine became a member of the WTO. WTO membership changes the initial conditions (for example, Ukraine's tariff levels) that are the point of departure for the Ukraine/EU FTA negotiations. Chapter V is therefore devoted to updating the GTAP-7 database to incorporate Ukraine's WTO accession commitments, and to quantitatively assessing how WTO accession will affect agriculture in Ukraine. We are grateful to Janine Pelikan and Martina Brockmeier for giving us access to their tariff aggregation software. The results once again highlight the importance that Ukraine will have to attach to meeting quality standards if it wishes to reap the full benefits of WTO membership in agriculture.

Chapter VI closes with an outlook. The work presented here has established an up-to date modeling platform as a basis for more detailed analysis of FTA options in the future. Both the creation of this modeling platform and the simulations carried out with its have been subject to ongoing peer review by World Bank experts John Nash and Will Martin, and we are very grateful for their many constructive and insightful comments. Finally, we are very grateful to Matthias Grueninger for his great patience and many helpful suggestions and comments in leading the work that went into this paper.

I. Summary

i) Past experience with FTAs involving the EU

Agriculture (including food products) is of particular interest for Ukraine. However, in FTAs involving the EU, agriculture is always given special treatment and subject to less and slower liberalization than other sectors. Even the very comprehensive FTA between Chile and the EU did not liberalize agriculture very deeply. The only FTAs involving the EU that had a major agricultural component were the Europe Agreements with the countries of Central and Eastern Europe. But these were tailored towards EU accession from the very beginning, so they cannot serve as blueprints for possible negotiation outcomes involving Ukraine. For agriculture, the EU is unlikely to offer Ukraine more than it has already offered in the course of the ongoing Doha Round negotiations.

The cases of Chile and EUROMED (e.g. Morocco) show that the EU's preferred instrument for agriculture in FTAs is the tariff rate quota. A partner country's agricultural exports to the EU can increase as a consequence of an FTA, if the country succeeds in filling the quotas it receives. This highlights the importance of food safety and quality standards and certification systems. Whenever tariff rate quotas are applied, the question of how to distribute the associated quota rents arises. This highlights the importance of transparency and governance issues.

Tariffs are important, but they should not be overestimated. Non-tariff barriers, incomplete information and security barriers are often just as or more important determinants of trade between industrialized countries. The rise of the EU as a trading partner for Chile is indicative in this regard. The broad scope of the EU's FTA with Chile has helped to substantially to deepen trade relations between the two partners. Trade facilitation ranging from reduction in red tape, to speedier handling of exports and imports, and to better market information systems is a potentially fruitful area in which Ukraine might be able to receive support from the EU. However, deep integration ('FTA plus') takes time to negotiate (four years in the case of the FTA with Chile, despite a long tradition of agreements between EU and Chile).

Ukraine should explore the possibility of securing assistance from the EU along the lines of the SAPARD program for EU accession candidates, which provided valuable technical support for the restructuring of the agri-food industries and improving the institutional framework for agriculture. Furthermore, it would be advisable to include a 'rendezvous-clause' that provides for flexible response to possible imbalances in an FTA that become apparent as it is implemented, or to changes in external conditions that influence the functioning of an FTA (e.g. changes on world markets).

ii) Generating quantitative estimates of the impact of trade liberalization

Trade liberalization creates economic opportunities and political challenges. Careful numerical simulations of the possible outcomes of trade liberalization both before and during negotiations can help policy makers take advantage of opportunities and anticipate and appropriately respond to the challenges.

Trade policy simulations can be produced by a variety of modeling tools, ranging from simple single-market models, to multi-market models, to computable general equilibrium models (CGEs). Multi-market and CGE models use the single market model as a basic building block. Multi-market models capture links between markets (e.g. substitution effects between grains and oilseeds both in production and consumption). CGEs go one step further and capture economy-wide impacts of changes on individual markets. When agriculture plays an

important role in the overall economy (e.g. in a country such as Ukraine), these impacts should be considered.

The numerical simulations reported in this paper are produced using the Global Trade Analysis Project (GTAP) model. GTAP has emerged as the largest and most dynamic global network of modeling experts and policy makers worldwide, and the GTAP model is used by numerous governments, ministries of agriculture and research institutions. GTAP offers a relatively disaggregated depiction of agriculture (12 farm and 8 processed food products) and the most recent GTAP database includes Ukraine for the first time. Hence, GTAP provides a useful platform for the planned Ukraine-EU FTA analysis.

iii) Assessing the impact of stylized Ukraine-EU FTA scenarios

The first scenarios that are presented in this paper are not meant to be realistic, because it is too early in the FTA negotiating process to know exactly what the negotiating parties will bring to the table. Instead, these first scenarios are used as simple examples to illustrate how the GTAP model can be utilized to guide analytical discussions about potential trade policy changes. These scenarios are especially meant to provide transparency with regard to the use of the GTAP model, the types of results it can produce, and its limitations.

Two scenarios are simulated. The first assumes that all bilateral tariffs between the EU and Ukraine are reduced by a rate of 50%. The second scenario is identical to the first except that it also includes a 5% exogenous boost in technical change in Ukrainian agriculture.

The results indicate that both Ukraine and the EU would benefit from trade liberalization. They highlight the importance of improving the productivity of Ukrainian agriculture so that Ukraine is able to draw the greatest possible benefit from the opportunities provided by increased access to EU markets, and to stand up better to the increased competition that goes hand-in-hand with this access. In agriculture, the key change is an increase in production of wheat and other grains in Ukraine, and corresponding increases in Ukraine's exports of these products to the EU.

The simulation of these stylized FTA scenarios is based on a database that does not reflect Ukraine's WTO commitments. Since Ukraine became a member of the WTO on May 16, 2008, the basis (e.g. Ukraine's tariff levels) upon which FTA negotiations with the EU will take place has changed since the data incorporated into the GTAP 7 database. Hence, in a next step we have focused on incorporating Ukraine's final WTO commitments into the GTAP database to provide an up-to-date platform for the future assessment of more detailed and realistic FTA scenarios.

iv) Assessing the impact of Ukraine's accession to the WTO

To provide a quantitative assessment of how WTO accession affects agriculture in Ukraine, four scenarios are simulated. Scenario 1a assesses the impact of Ukraine's immediate WTO accession commitments, which will presumably be implemented in 2009. Scenario 2a considers Ukraine's final WTO commitments, of which the last must be implemented by 2013. Scenarios 1b and 2b are equivalent to 1a and 2a, respectively, but assess how improvements in the production efficiency of primary agriculture in Ukraine would modify the impact of WTO accession.

Simulation results indicate that Ukraine can expect gains from a more efficient allocation of its resources following WTO accession. More efficient allocation of resources in line with comparative advantage will spur Ukrainian production and exports of products such as wheat, other grains, and oilseeds, but also of several processed food products that benefit from less expensive intermediate inputs. However, overall gains are modest.

The modest estimates presented here do not account for growth effects that are likely to occur as a result of WTO accession. Such effects include technological spillovers from intensified trade in specific sectors, capital accumulation, and the facilitation of trade and investment. Scenarios 1b and 2b, which include the impact of exogenous productivity improvements, generate much larger simulated benefits than the pure accession Scenarios 1a and 2a.

Ukraine's allocative gains from WTO accession are largely offset by terms of trade losses for exports of grains, vegetable oils and some processed foods such as dairy products and beef, sheep and goat meat. The cause of these losses is that Ukraine is economically speaking a 'large country' for these products. If Ukraine produces and exports more wheat as a result of allocative improvements that are triggered by WTO accession, then prices for wheat on world markets will fall as a result, offsetting some of the allocative gains.

In the case of processed products such as beef and milk it may sound odd that Ukraine is a 'large country' because it actually has quite a small share of overall world trade. However, Ukraine's exports of these products are concentrated on a small number of destinations, especially Russia. Many of the products in question can only be exported to Russia and some other FSU countries because they fail to meet quality standards elsewhere. When Ukrainian production of these products increases due to increased allocative efficiency, exports to Russia increase further and prices there fall, generating negative terms of trade effects. If Ukraine's export structure was more diversified, increased production and exports could be spread over a larger number of markets and would not generate these negative effects. This highlights the great importance of adopting internationally accepted quality standards. The benefits of WTO accession especially for processed food products will hinge to a large extent on whether Ukraine succeeds in this regard.

Ukrainian exports of agricultural products to the EU, North America, Eastern Europe and Russia increase according to the simulations presented here, but imports especially from South America increase as well. For some products, imports grow because Ukrainian consumers switch to higher quality imported goods even though domestic production increases. As a result, exports must increase as well, and this can exacerbate the terms of trade problem mentioned above. For this reason, improving food quality is not just a matter for exports, but also for the domestic market in Ukraine.

II. Other Countries' Experiences with Free Trade Agreements with the EU: Insights for Ukraine

II.1. Introduction

The aim of this paper is to derive insights for Ukraine from the experiences that other countries have gathered from free trade agreements (FTA) with the EU, with an emphasis on agriculture. The number of regional trade agreements in force has grown almost exponentially since the end of the Uruguay Round; as of April 2008, the cumulated number of such agreements notified in Geneva amounted to 208 (WTO 2008). On the supply side, lackluster recent progress in the multilateral trading system, most notably sluggish progress in the WTO Doha Round negotiations in Geneva, is probably the most important cause of this rise in more regionally-oriented trade agreements. On the demand side, preferences for the scope and nature of integration agreements have shifted towards 'deep integration' approaches in which standards related to labor or the environment, general political issues, and other non-trade concerns receive more attention than in the past. These new preferences for deep integration are easier to incorporate in bilateral or regional than in multilateral trade agreements.

The experiences that other countries have gathered from their FTAs with the EU can only provide useful insights for Ukraine's policy makers if i) the FTAs in question involve countries which are similar to Ukraine in terms of trade, economic structure, comparative advantage, or other key economic factors, and ii) the particular situations and objectives associated with the selected FTAs are taken into account.

Beyond the multilateral trading system as negotiated in the WTO agreements, the EU organizes most of its external trading relationships as part of its Generalized System of Preferences (GSP), which (in most cases) unilaterally grants countries preferential status mainly based on the state of their economic development. Bilateral agreements supplement the basic GSP, depending on the partner country's relationship with and strategic importance to the EU. In effect, the EU applies WTO most favored nation (MFN) treatment to only a small number of industrialized countries, and even here, amendments and exceptions for individual sectors – especially agriculture – play an important role.

The EU uses FTAs in various areas:

- To grant development assistance (aid for trade);
- To pave the way for EU accession (Europe Agreements);
- As an integral part of the EU neighborhood policy (ENP); and
- To stabilize and improve bilateral relationships and economic well-being for both partners in an agreement (the 'standard' FTA).

The first category is rarely used on a pure symmetrical basis, and usually has the goal of further developing a trade relationship based on the GSP, from unilateral preferential access for the partner country to the EU's market to a more balanced relationship. Since the partner countries in question are generally least developed countries, this category cannot generate many insights for Ukraine.

The Europe Agreements in the second category, however, are relevant for Ukraine, even if the perspective of accession to the EU in the near future is missing. This is because there are similarities between Ukraine and some of the Central and Eastern European countries

(CEECs) that benefited from Europe Agreements (similar initial situations, similar economic and agricultural structures).

Strictly speaking, the proposed FTA between the EU and Ukraine belongs to the third category (ENP). However, existing FTAs with other EU neighbors (under the Euro-Mediterranean Partnership, which is to evolve into a full-fledged Euro-Mediterranean FTA by 2010) are of limited relevance to Ukraine due to the vast differences in conditions between Ukraine and these Mediterranean neighbors (e.g. Morocco). Nevertheless, the role of tariff rate quotas for agricultural products in these agreements (which most likely will show up in the negotiations between Ukraine and EU, too) might convey some lessons.

Finally, it is possible to derive insights for Ukraine – in particular with regard to the treatment of non-trade issues – from some FTAs in the fourth category (e.g. the EU's FTA with Chile).

Based on these considerations, we focus this paper on the following FTA experiences:

1. The Europe Agreement with Hungary;
2. The EUROMED Association Agreements with Morocco; and
3. The EU's FTA with Chile.

We begin by presenting some background information on the characteristics of FTAs and their possible advantages and disadvantages in section 2. Sections 3 to 5 contain reviews of the Europe Agreements with Hungary, the Partnership Agreement with Morocco, and the FTA with Chile, respectively. Section 6 closes with a list of insights that can be derived from these experiences.

II.2. Background

II.2.1. Multilateral agreements versus FTAs?

FTAs are a specific form of regional trade agreements, which are usually classified according to the degree of integration. The literature (e.g., Jovanovic, 2005) usually distinguishes the following four 'idealized' types of economic integration:

1. FTA: Removal of all restrictions on bilateral trade in goods and services. Each partner maintains separate border protection policies;
2. Customs union: FTA plus common border protection;
3. Common market: Customs union plus free factor mobility; and
4. Economic and monetary union: Common market plus harmonization of economic and monetary policy.

Regional trade agreements such as FTAs automatically entail the maintenance of discrimination[1] against third countries. For this reason, when evaluated against the benchmark of full multilateral trade liberalization, all regional trade agreements, even if they generate benefits for the countries involved, are inferior from a global welfare point of view.

[1] Regional agreements might even increase discrimination against third countries, but under WTO Article 24, negatively affected third countries can claim compensation in such a case.

Economists and trade policy specialist have long – and without arriving at a universal consensus – debated whether the proliferation of FTAs is a boon or a hindrance to the process of multilateral trade liberalization (e.g, Panagariya 1999). The image of 'spaghetti bowls' (or 'noodle bowls' for the Asian case) is frequently employed to illustrate the dangers of increasing regionalism: Trade relations are more complex, the confusion about which rules and regulations are important for which of the $n(n-1)/2$ bilateral pairs in a regional agreement with n partners might lead to implicit protection of domestic firms. On the other hand, the increasing importance of non-tariff barriers in international trade (since tariffs themselves have been lowered considerably in past GATT/WTO rounds), implies that further liberalization requires a specific focus on standards and procedures in trade. Hence, trade *facilitation* is nowadays seen as being at least as important as further reductions in average tariffs. Regional agreements may be better suited to achieving trade facilitation because the partners tend to have more homogeneous interests and initial economic conditions. Some analysts see the world moving towards three large trading blocs (Europe, the Americas, and Asia) within which regional partners are achieving degrees of trade liberalization and facilitation that have proven increasingly difficult to achieve multilaterally. Pessimists worry that these blocs could become fortresses; optimists hope that increased integration within the blocs will be a stepping-stone to better multilateral trading relationships.

Ultimately, this is an empirical question which will only be answered by future developments. Substantially protected sectors such as agriculture, however, are unlikely to benefit from the proliferation of FTAs because they are very often exempted (or at least treated with much more caution) in these agreements. Hence, agricultural trade liberalization will likely require progress in the multilateral trading system.

II.2.2. Trade creation versus trade diversion

The economic analysis of preferential trade agreements dates back to Viner (1950), who distinguished between 'trade creation' and 'trade diversion' effects of regional trade agreements.

Trade creation takes place when the reduction in tariff barriers between partners in an FTA leads to the substitution of higher-cost domestic production in one participating country by lower-cost production in another. Trade diversion takes place when the reduction in tariff barriers between partners leads to the substitution of lower-cost production in a third, non-participating country by higher-cost production in a partner country. Even though the partner country's production may be lower-cost than domestic production, the crowding out of even lower-cost international competitors that trade diversion entails reduces net global welfare. Furthermore, the displacement of imports from a third country (subject to tariffs) by imports from a partner country (duty-free) means that trade diversion also reduces fiscal revenues. If governments need to replace these revenues using a distorting tax, this further increases the costs resulting from trade diversion.

An FTA is more likely to lead to trade creation if the participating countries have differing comparative advantages. Trade diversion becomes more likely when the countries forming a FTA are 'too' similar in terms of comparative advantages, and retain substantial external protection against third countries.

II.2.3. Shallow versus deep integration

The traditional analysis of trade creation and trade diversion focuses exclusively on tariff barriers and largely ignores other important border-related trade barriers. Anderson and van Wincoop (2005) decompose border-related barriers according to their causes into tariff and non-tariff policy measures, differences in language, in currency, information costs, and security. According to their results, for industrialized countries, on average only about 11% of trade costs due to border-related barriers are caused by tariffs, while another 6% are caused by non-tariff barriers to trade. The most important border-related barriers are language (48%) and currency differences (16%), followed by information costs (14%). Security barriers are least important, accounting for the remaining 5%. Obviously, language and currency differences cannot be addressed by means of an FTA. However, the importance of information costs and non-tariff border-related barriers necessitates a more comprehensive design of FTAs, if these barriers are to be effectively reduced.

The concept for addressing these issues in trade negotiations has been labeled 'deep integration', as opposed to a simple reduction of tariffs on bilateral trade flows which is labeled 'shallow integration'. Deep integration has been favored by the US and the EU in recent years in virtually all of their regional trade agreements. When the EU negotiates selective trade preferences under the GSP, these preferences are usually coupled to a set of broadly defined policy guidelines. Failure to comply with these guidelines usually means that the trade preferences are withheld for some or all imports into the EU. FTAs involving the EU have also been characterized by deep integration. An imperfect but suggestive indicator of the increasing role of deep integration is the steady increase in the length of the legal texts that describe the contents of FTAs. For example, the texts on the EU-Chile FTA comprise over 1400 pages (including the tariff schedules).

The importance of quality and safety standards, both in terms of agreement on and in capability of compliance with, cannot be underestimated. In the EU, these standards constitute an important part of the non-negotiable *acquis communautaire* that all prospective members must adopt in full as a precondition to full access to the single European market. The number of standards notified to the WTO under the TBT and SPS agreements is not particularly high in the EU compared with other OECD countries, but “these measures [in the EU] are more trade-impeding than the ones adopted by other OECD countries” (Disdier, et al., 2008). Deep integration will ‘export’ these standards at least partially to the partner country with its previously lower level of standards, where potential exporting firms will still face similar non-tariff barriers to trade through the higher standards as before. Therefore, standards are an important determinant of the success of an FTA for the partner country in such a setting.

Whether or not deep integration is always better than alternatives based on shallow integration is an empirical question. All other things being equal, an FTA that successfully reduces information costs, incorporates trade facilitation, foresees a dispute settlement procedure, etc. will be superior to an FTA that only addresses tariffs. However, deep integration often comes in a package with special and differential treatment of some sectors. While this type of special treatment is at a first glance independent of the depth of the integration agreement, there are two good reasons to fear more exceptions from the basic rules in a deep integration agreement. First, some of the concerns to be addressed by a deep integration approach, such as compliance with environmental or social standards, might be abused by one of the partners to grant targeted protection for some of its industries. Second, the complexity of a deep integration agreement makes it more likely that special treatment of a sector slips into the negotiation, e.g., as part of some package deal. Such exceptions might be justified in some cases, but too often the reason is successful lobbying by an import-competing industry which

fears negative impacts from a FTA, for example because the FTA threatens monopoly power that it has hitherto enjoyed on the domestic market.

II.2.4. Static versus dynamic effects

The economic analysis of the welfare impacts of FTAs has traditionally focused on once-off static effects. However, the dynamic effects of increasing trade and integration between two countries or trading blocs can be much more important. It makes sense to distinguish between economic and political impacts. The latter are possibly more difficult to quantify, but in the long-run they can have vital feedback effects on the former.

An important dynamic impact of an FTA in direct economic terms takes place via increased foreign investment. A considerable body of evidence indicates that foreign direct investment (FDI) can trigger significant productivity gains in the receiving country (see, for example, Arnold and Javorcik, 2005). FDI is a key mechanism for transferring sophisticated technologies across borders. FDI also ensures that experienced human capital is not a limiting factor for the implementation of these new technologies in the receiving country. Foreign direct investors have a strong incentive to supervise and monitor appropriately the new technology packages that they provide. This supervision also contributes to the successful management of labor quality and monitoring issues.

Furthermore, an FTA might be a useful instrument for reducing domestic market power in certain sectors. If market power stems from increasing returns to scale, a FTA might be doubly helpful: By increasing the size of the market, it reduces average production costs for firms that can become active in partner markets, while limiting their scope for strategic pricing behavior.

Another dynamic effect involves reactions to trade diversion. If an FTA leads to trade diversion, and this is (correctly) perceived to be a problem by domestic policy makers, the obvious solution is to reduce tariffs on imports from low-cost third countries. This will trigger opposition by the affected industries, but one the FTA has been established these industries will likely be located in partner countries and not at home (after all, trade diversion results when lower – but not lowest – cost production in partner countries replaces higher-cost domestic production). To the extent that this is true, it will be politically easier to reduce the level of protection vis-à-vis third countries post-FTA than it was pre-FTA when the negatively affected industries were located at home.

The main political impact of an FTA is an addition to credibility. By entering into an FTA, a country voluntarily reduces its ability to exercise discretionary trade policy; the *ad hoc* introduction of barriers to trade with its partner countries is no longer possible or at least circumscribed. A deep integration FTA can further add to a country's credibility by underscoring its commitment to democratic reforms, improvements in labor rights, social standards, etc.

II.3. Europe Agreements

The Europe Agreements, which were the main instrument for paving the way to the EU-accession of the Central and East European Countries (CEECs), were not classical regional trade agreements that focus solely on dismantling tariffs. Instead, they were designed to facilitate the adoption of the *aquis communautaire*, and to prepare domestic industries in the candidate countries for expected competitive pressure in the aftermath of accession.

In this sense, the impact of the Europe Agreements on bilateral trade flows cannot be directly extrapolated for an EU-Ukraine FTA. Nevertheless, a glance at the overall development since 1995 is useful because Ukraine and the CEECs share similar legacies in economic and agricultural structures, and because Ukraine has stated that it intends to harmonize key elements of its agricultural policy with that of the EU.[2] The natural candidate for comparison in terms of agriculture is Hungary (Poland's agricultural structures being very different), so we present the development of total (Table 2-1) and agricultural trade (Table 2-2) between the EU and Hungary below.

Table 2-1: Development of total EU trade with Hungary (1995-2007, in million €)

	Imports by the EU	Exports to Hungary	Total trade	Annual change	Balance
1995	7610	8731	16341		1120
1996	8847	10028	18875	15.5%	1181
1997	11684	13596	25281	33.9%	1912
1998	14655	16863	31519	24.7%	2208
1999	17624	18442	36066	14.4%	817
2000	22046	23039	45086	25.0%	993
2001	24825	23878	48703	8.0%	-947
2002	25268	25030	50298	3.3%	-238
2003	26033	26228	52260	3.9%	195
2004	27938	27974	55912	7.0%	37
2005	30204	29714	59917	7.2%	-490
2006	33470	34268	67738	13.1%	798
2007	38285	36930	75215	11.0%	-1355

Source: Comext Database

The Europe Agreements for Hungary were signed in 1991, and effective since 1994. They involved full tariff dismantling for about 80% of all industrial goods. This dismantling was asymmetric in that the speed of tariff reductions was higher for the EU than for Hungary. Trade with agricultural goods was either exempted from gradual liberalization, or preferential treatment was granted subject to quantitative restrictions. The agreements were substantially extended for agricultural goods in order to prepare the accession process and to align CEEC agricultural policy with the CAP. In 2000, the so-called *Double Zero* agreements were introduced by implementing zero tariffs with zero quantitative restrictions for selected goods, most notably pork and poultry. In 2003, the *Double Profit* agreements opened quotas with zero tariffs even for the most sensitive agricultural products, i.e., those with unlimited intervention in the EU such as wheat, coarse grains, beef and dairy. In effect, 95% of all Hungarian trade with the EU was liberalized by 2003.

Besides the gradual phasing in of trade preferences up to almost complete liberalization, the Europe Agreements involved also technical help and investment aids. In agriculture, Support for Pre-Accession Measures for Agriculture and Rural Development (SAPARD) was the

[2] The economic program of the Government of Ukraine includes the following among its "priority tasks" for agricultural policy: "implementation of the European principles of state support of agricultural producers taking into account the size of cultivated land, the unit of products and the unit of exported products".

relevant EU-funded program. These programs helped industries in the CEECs to restructure in order to prepare them for accession – in particular to prepare them for competition from EU producers – and helped establish trade facilitating infrastructure such as certification and quality control systems in the CEECs. A comparable instrument could prove very useful for Ukraine.

Table 2-2: Development of trade in food and live animals (SITC 1) of the EU-27 with Hungary (1995-2007, in million €)

	Imports by the EU	Exports to Hungary	Total trade	Annual change	Balance
1995	874	346	1220		-528
1996	950	289	1239	1.5%	-660
1997	922	359	1281	3.4%	-563
1998	951	377	1328	3.7%	-574
1999	998	341	1339	0.8%	-657
2000	1062	433	1495	11.7%	-629
2001	1200	528	1728	15.6%	-673
2002	1303	595	1898	9.9%	-708
2003	1325	629	1953	2.9%	-696
2004	1381	835	2216	13.4%	-546
2005	1605	1175	2780	25.4%	-429
2006	1779	1379	3158	13.6%	-401
2007	2117	1588	3705	17.3%	-530

Source: Comext Database

The total volume of trade between Hungary and the EU increased substantially in the second half of the 1990s, by about 25 % per annum. However, this substantial growth slowed after the millennium, and recovered around the date of accession in 2004. The last column indicates EU exports to Hungary grew slower than imports from Hungary, so that the EU's trade balance with Hungary is now negative. However, the balance is small relative to the overall volume of trade and changes from year to year. It is, however, striking that total trade picked up considerably after accession even although the Europe Agreements had already granted full access to the EU prior to accession. This highlights the importance of deep integration beyond pure tariff reduction.

The agricultural trade data in Table 2-2 reinforces this notion. Agricultural trade grew only insignificantly until 2000, picked up speed in 2000 and 2001, lost momentum once more, and picked up after accession. The agricultural trade balance between the EU and Hungary has remained constantly in surplus for the EU. The accelerated growth after accession is again probably caused by the elimination of non-tariff barriers to trade. Another likely cause is connected to the steady improvements in trading relations, which now take place under a largely harmonized framework.

II.4. European Neighborhood Policy: EUROMED

The ENP comprises more than just trading relations between the EU and her neighbors. Instead, trade policy is seen as an important building block in overall external relations. The Mediterranean countries within the ENP are usually abbreviated as EUROMED-9: Algeria, Egypt, Gaza and Jericho, Israel, Jordan, Lebanon, Morocco, Syria, and Tunisia.[3] Formal relationships date back to the second half of the 1970s when cooperation agreements with all nine countries (except Palestine) were signed. The next milestone was the substantial expansion of trade preferences in the aftermath of Spain's and Portugal's accession to the EU in 1986. A new quality in the relationships with the Mediterranean countries was targeted with the introduction of the Barcelona process based on the Conference of Barcelona in 1995.

Three pillars constitute the foundation of the Barcelona progress: i) dialogue on policy and security in order to increase the stability of the region; ii) partnership in social and cultural terms to deepen the understanding of the people and to strengthen civil society; and iii) partnership in economic and financial terms in order to achieve unhampered trade in the Mediterranean area. FTAs with all countries are to be used as an instrument for this latter objective, which is to be achieved by 2010. Negotiations for the Association Agreements have been concluded for EUROMED-9 between 1995 and 2004, and are in force for all countries except Algeria and Syria. With regard to agriculture, however, most Association Agreements have postponed free trade to some future date. A notable (albeit partial) exemption is the agreement with Morocco.

Negotiations on the Association Agreement with Morocco were concluded in 1996 but only came into force in March 2000. Moroccan exports of industrial goods are granted free entry into EU, while tariffs on industrial imports by Morocco from the EU are to be gradually reduced. The provisions for agricultural trade were originally mostly based on very small tariff rate quotas and entry price quotas. However, some improvements in agricultural trade liberalization between EU and Morocco were agreed upon in 2003, and came into force in 2004. Furthermore, the so-called 'rendezvous clause' – an interim meeting to address possible difficulties in EU-Moroccan trade relations – foresees additional agricultural liberalization talks as of 2007.

[3] Adding Turkey to the list, the acronym EUROMED-10 is also used. Turkey, however, is a candidate country for EU accession. Hence, the agreements with Turkey are of a different quality.

Table 2-3 indeed points to a strong impact of the FTA on total trade in the first year of implementation (2000), followed by stagnation until 2004. Total trade then showed substantial growth in 2004-2005. However, EU imports from Morocco fell by more than 20% in 2006, and have not yet fully recovered. Average annual growth rates of total trade were twice as high before 2000 as after. The partial recovery in 2007 may be due to negotiations under the 'rendezvous-clause'.

For agricultural products, new trade concessions in form of additional tariff rate quotas have been in force since 2004, but full liberalization is not scheduled. Trade in food (Table 2-4) increased continuously since 2004 at an average annual growth rate of almost 10 % through 2007.

Table 2-3: Development of total EU trade with Morocco (1995-2007, in million €)

	Imports by the EU	Exports to Morocco	Total trade	Annual change	Balance
1995	4017	4728	8745		711
1996	4233	4699	8932	2.1%	467
1997	4750	5329	10079	12.8%	579
1998	5334	6603	11937	18.4%	1269
1999	5553	6627	12180	2.0%	1075
2000	6015	7736	13751	12.9%	1720
2001	6241	7476	13717	-0.2%	1236
2002	6295	7697	13993	2.0%	1402
2003	6228	8072	14300	2.2%	1843
2004	6472	8754	15226	6.5%	2282
2005	8971	11578	20549	35.0%	2608
2006	7031	10160	17191	-16.3%	3130
2007	7614	11837	19451	13.1%	4222

Source: Comext Database

Table 2-4: Development of trade in food and live animals (SITC 1) of the EU-27 with Morocco (2000-2007, in million €)

	Imports by the EU	Exports from Morocco	Total trade	Annual change	Balance
1995	876	482	1358		-394
1996	994	338	1332	-1.9%	-655
1997	975	303	1278	-4.0%	-672
1998	957	395	1352	5.8%	-562
1999	1079	416	1495	10.6%	-663
2000	1152	621	1773	18.6%	-531
2001	1236	519	1755	-1.1%	-717
2002	1400	494	1894	7.9%	-907
2003	1393	492	1885	-0.5%	-901
2004	1418	490	1909	1.3%	-928
2005	1628	562	2190	14.7%	-1067
2006	1718	520	2238	2.2%	-1197
2007	1772	821	2593	15.9%	-951

Source: Comext Database

The experience with the EU-EUROMED agreement in agriculture, as exemplified by Morocco, illustrates that quantitative import restrictions (i.e. granting limited tariff rate quotas) are the EU's preferred instrument for integrating agriculture in an (otherwise free) trade arrangement. The effect on trade can be positive, provided the partner country is able to

fill the quotas it receives. However, tariff rate quotas raise the question of quota rents and their distribution in the recipient countries. If quotas are auctioned to exporters, the government of the recipient country can collect quota rents and invest them, for example, in improving quality testing and certification systems for the products in question. In many countries, however, quotas are simply given to traders in a non-transparent manner, fostering corruption and waste. For example, potential license holders might attempt to bribe the government officials who are in charge of distributing tariff rate quotas.

For Morocco, tomatoes are an important agricultural product whose export to the EU is regulated by a tariff rate quota. Chemnitz and Grethe (2005) find that the quota binding, and generates a rent of about 25% of the total export value. This distribution of rents favors Moroccan exporters. The 2004 trade agreements involved an additional 30,000 t (from 190,000 t) tariff rate quota. The quota system is a complex construct, involving monthly quotas, an entry price system, and regulations to ensure that out-of-quota exports to the EU are penalized in following years. In consequence, the export sector for tomatoes in Morocco is highly organized, with specialized institutions in order to ensure that rents from the tariff rate quotas are maximized.

II.5. Latin American FTAs: The case of Chile

The FTA between Chile and the EU became effective in 2003, after successful completion of negotiations in the year before. It is just one pillar of a broader Association Agreement, which includes political association and economic cooperation as additional pillars. The negotiations had started in 1999; ten negotiation rounds were necessary before the details of the Association Agreement were accepted. With a total of more than 206 articles, augmented by 18 annexes, this FTA is an example of the extent of the details which are included in a deep integration FTA. Trade is just one of five parts in the FTA itself, the others dealing with general provisions, dialogue on policy, all other aspects of cooperation, and final provisions. The ultimate goal is complete liberalization of trade, and this is already planned for industrial goods. For agriculture, however, the FTA provides for permanent exemptions for nearly 20% of the tariff lines at the HS-6 level.

Chile is of particular interest because it had already liberalized almost all of its trade on an MFN basis before signing the FTA (Association Agreement) with the EU. From the EU viewpoint, there was therefore little point in negotiating a shallow FTA because there were essentially no tariffs left which could have been subject to further reduction. Hence, the EU position was clearly oriented towards deep integration. Within the EU, there was strong domestic political pressure to establish environmental and social standards in the Association Agreement with Chile. For Chile on the other hand, the primary goal of the negotiations was to increased market access by securing tariff concessions from the EU.

All reductions in import tariffs were either effective immediately, or were to be phased over at most three (manufactured goods) or ten years (agriculture). For agricultural goods, as a precondition for successful completion of the negotiations, various alternatives to full liberalization were implemented:

- Tariff reduction of only 50% instead of full liberalization (e.g. peanut butter);
- Liberalization of *ad valorem* tariffs while maintaining specific tariffs (citrus fruits);
- Liberalization of specific tariffs while maintaining *ad valorem* tariffs (selected dairy products);
- No liberalization for selected products of designated origin (wine); and

- Tariff rate quotas (selected bovine meats).

Table 2-5: Development of total trade of the EU-27 with Chile (2000-2007, in million €)

	Imports by the EU	Exports to Chile	Total trade	Annual change	Balance
2000	5215	3498	8713		-1718
2001	5197	3731	8928	2.5%	-1466
2002	4911	3172	8083	-9.5%	-1739
2003	5001	2962	7964	-1.5%	-2039
2004	7354	3120	10474	31.5%	-4233
2005	8157	3919	12075	15.3%	-4238
2006	12489	4281	16770	38.9%	-8207
2007	12576	4684	17260	2.9%	-7891

Source: Comext Database

Table 2-6: Development of trade in food and live animals (SITC 1) of the EU-27 with Chile (2000-2007, in million €)

	Imports by the EU	Exports to Chile	Total trade	Annual change	Balance
2000	736	70	806		-666
2001	938	66	1004	24.6%	-872
2002	964	67	1031	2.6%	-897
2003	1038	66	1104	7.1%	-972
2004	1157	49	1206	9.2%	-1108
2005	1374	56	1430	18.6%	-1318
2006	1605	65	1670	16.7%	-1540
2007	1645	84	1729	3.5%	-1561

Source: Comext Database

Since the FTA between the EU and Chile came into force in 2003, the total volume of trade between the partners has more than doubled (Table 2-5). EU imports from Chile have grown by a factor of 2.5 (compared with 2002), while EU exports to Chile increased by about one third. Hence, Chile seems to have gained more than the EU both in relative and absolute terms. The EU-27 is now Chile's most important trading partner, just ahead of the US and China.

Trade in agricultural products was subject to less liberalization than in any other category. As a result, growth in agricultural trade was substantially lower than for trade overall (Table 2-6). Nevertheless, total trade in food and live animals between Chile and the EU grew on average by 11.9% per annum between 2000 and 2007.

II.6. Conclusions

Several conclusions are supported by the discussion in this paper. The difficulty in drawing a coherent picture from other countries' experiences is a result of the ambition of the negotiations: Deep integration is the only scenario which the EU is willing to use as a basis for talks. Many issues involved in a deep integration agreement are vague and difficult to quantify, and areas such as competition, trade facilitation, etc. are highly conditional on the specific institutional framework in the partner countries.

The main messages which are supported from our analysis can be grouped as follows:

- Agriculture (including food products) is of particular interest for Ukraine. However, in FTAs involving the EU, agriculture is always given special treatment and subject to less and slower liberalization than other sectors. Even the very comprehensive FTA between Chile and the EU did not liberalize agriculture very deeply. The only FTAs involving the EU that had a major agricultural component were the Europe Agreements with the countries of Central and Eastern Europe. But these were tailored towards EU accession from the very beginning, so they cannot serve as blueprints for possible negotiation outcomes involving Ukraine. For agriculture, the EU is unlikely to offer Ukraine more than it has already offered in the course of the ongoing Doha Round negotiations.
- The credibility of reform steps in Ukraine further increases if FTA negotiations with the EU are pushed forward on top of recent WTO accession. But deep integration ('FTA plus') takes time to negotiate (four years in the case of the FTA with Chile, despite a long tradition of agreements between EU and Chile). Establishing standards which help ensure access to EU (and other OECD) markets without exhausting the adjustment capacity of Ukrainian firms, will be a long-run boon to economic transition in Ukraine. Dynamic impacts in the form of FDI attraction provide an additional bonus.
- The cases of Chile and EUROMED (e.g. Morocco), show that the EU's preferred instrument for agriculture in FTAs is the tariff rate quota. A partner country's agricultural exports to the EU can increase as a consequence of an FTA, if the country succeeds in filling the quotas it receives. This highlights the importance of food safety and quality standards and certification systems. Whenever tariff rate quotas are applied, the question of how to distribute the associated quota rents arises. This highlights the importance of transparency and governance issues.
- Tariffs are important, but they should not be overestimated. Non-tariff barriers, incomplete information and security barriers are often just as or more important determinants of trade between industrialized countries. The rise of the EU as a trading partner for Chile is indicative in this regard. The broad scope of the EU's FTA with Chile has helped to substantially to deepen trade relations between the two partners. Trade facilitation ranging from reduction in red tape, to speedier handling of exports and imports, and to better market information systems is a potentially fruitful area in which Ukraine might be able to receive support from the EU. However, deep integration ('FTA plus') takes time to negotiate (four years in the case of the FTA with Chile, despite a long tradition of agreements between EU and Chile).
- Ukraine should explore the possibility of securing assistance from the EU along the lines of the SAPARD program for EU accession candidates, which provided valuable support for the restructuring of the agri-food industries and improving the institutional framework for agriculture. Furthermore, it would be advisable to include a

‘rendezvous-clause’ that provides for flexible response to possible imbalances in an FTA that become apparent as it is implemented, or to changes in external conditions that influence the functioning of an FTA (e.g. changes on world markets).

III. Exploring Trade Policy Options with a General Equilibrium Model

III.1. Introduction

The World Trade Organization (WTO) is the international body that coordinates the determination and implementation of the rules of trade between nations. On February 5, 2008, the WTO General Council approved accession terms for Ukraine, and subsequent ratification by Ukraine's parliament led to Ukraine formally joining the WTO on May 16, 2008. WTO membership, in turn, is a precondition for formal negotiations on a free trade agreement (FTA) with the EU, which are expected to begin in the coming months. Both WTO accession and an FTA with the EU will require Ukraine to liberalize its agricultural trade.

Trade liberalization is one of the most promising and at the same time one of the most challenging tasks for policy makers. Economists stress the gains in economic welfare that can result from trade liberalization. At the same time, affected interest groups typically oppose changes to policies that protect their economic activities. Liberalization of *agricultural* markets has traditionally been among the most critical and controversial issues in trade negotiations.

An important task for applied economists is to provide policy makers and other stakeholders with quantitative assessments of the regional and sectoral distribution of potential gains and losses from agricultural and other market liberalization. The state of the art tool for the generation of such assessments is the Computable General Equilibrium (CGE) model. CGE models have evolved as powerful tools for the simulation of policy changes on the basis of real world data (van Tongeren, van Meijl and Surry 2001; Hertel 1999). CGE models have moved out of economists' computing laboratories (Hertel, 1999) and have become an integral part of the complex process of public decision making (Devarajan and Robinson 2002). Of course, any model is an approximation and can be misleading if implemented or interpreted without due regard to its limitations.

In this chapter we provide a condensed introduction to applied trade models in general and the specific model that will be used to produce specific simulations for discussion and presentation in later chapters and subsequent work. Following this introduction, the next section will discuss applied trade models in general. Section 3 then introduces the Global Trade Analysis Project (GTAP) model that will be used to analyze Ukraine-EU FTA scenarios. Section 4 concludes.

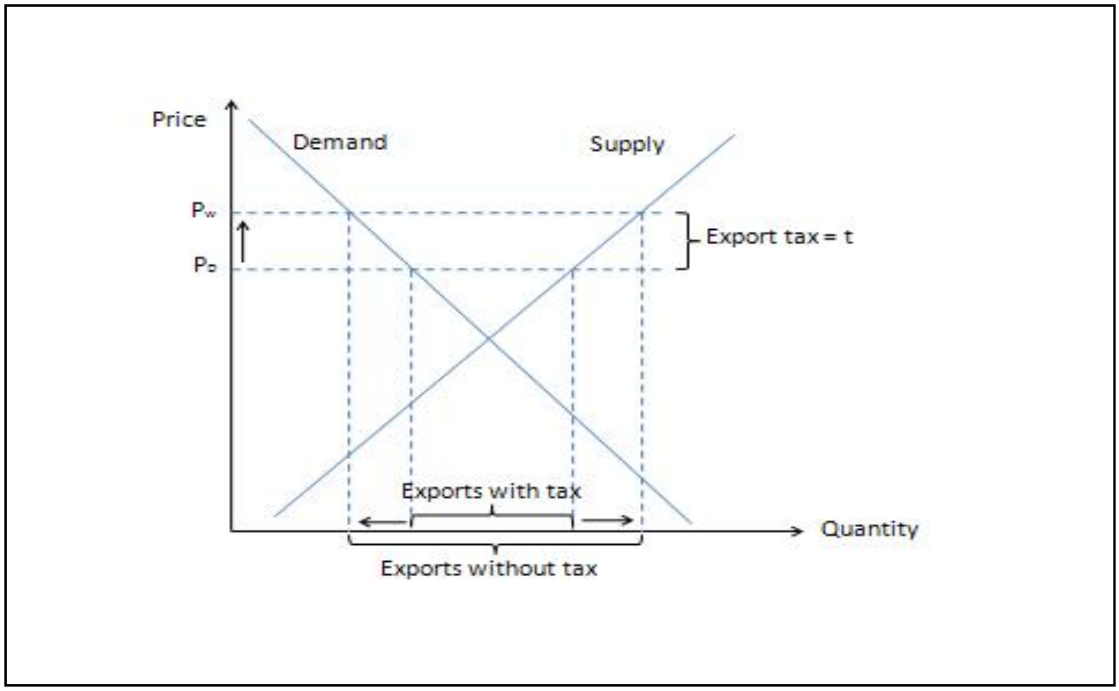
III.2. Applied trade models: synthesizing theory and data

III.2.1 Partial Equilibrium Models

The basic building block of economic market and trade policy analysis is the single market model (Figure 3-1). According to this model, quantities supplied and quantities demanded adjust together with prices to clear the market in equilibrium. In the initial situation depicted in Figure 3-1, an export tax is applied to the product in question (e.g. oilseeds in Ukraine). Because of this tax, the domestic price (P_D) is lower than the world market price (P_W). As a

result, the quantities supplied (demanded) are lower (higher) than would otherwise be the case. Removing the tax causes the domestic price to climb from P_D to P_W, which stimulates domestic production, reduces domestic quantity demanded and leads to a larger export surplus.

Figure 3-1: The basic single market model – the example of an export tax



Source: Own presentation.

A trade policy model puts this graphical representation into quantitative, mathematical form. The supply and demand reactions (i.e. how much production increases and how much domestic quantity demanded falls when the export tax is removed) are captured by mathematical parameters that depict the slopes and curvatures of the supply and demand functions in Figure 3-1. These parameters and functions are adjusted (calibrated) so that the model fits actual, observed prices and quantities in the base period. The modeler can then enter a hypothetical policy intervention (such as the elimination of the export tax), and the model will generate the price and quantity changes that can be expected to result. Using these price and quantity changes the model can also generate other information of interest such as changes in trade flows, incomes, consumer spending, government revenue/expenditure, and overall economic welfare (see Appendix Figure A-1).

In many cases the single market model alone can produce a useful approximation of the effects of a policy change. However, in order to quantify these effects more accurately it is necessary to also account for links to related factor and product markets. For example, the increased production that results when the export tax is removed in Figure 3-1 requires resources such as land and labor. Hence, a more complete model should also account for price and quantity effects on the markets for these resources, and on the markets for other products that use these factors. Similarly, the reduction in quantity demanded that also results when the export tax is reduced might induce increased consumption of substitute products. For example, if Figure 3-1 depicts the Ukrainian oilseed market, then removing the export tax will increase domestic oilseed prices, inducing livestock producers to feed more grains in place of oilseed products. A more complete model should therefore account for price and quantity changes on the markets for these substitutes as well.

Multi-market models incorporate these links between related factor and product markets. A multi-market model is composed of a series of single market models such as that depicted in Figure 3-1, one for each relevant market. These are linked by parameters that depict how price or quantity changes on one market will affect supply and demand curves on other markets. For example, in a multi-market model, the depiction of the oilseed market in Ukraine in Figure 3-1 would include parameters that shift the supply and the demand curves up if grain prices rise. Similarly, supply and demand on grain markets would also depend on oilseed prices, and livestock supply would respond to grain and oilseed price changes, etc. Such multi-market models can depict and link as many as several dozen single markets, depending on what markets and linkages are relevant in a given country, and what questions the modeler and the policy makers for whom he is working are interested in.

III.2.2 General equilibrium models

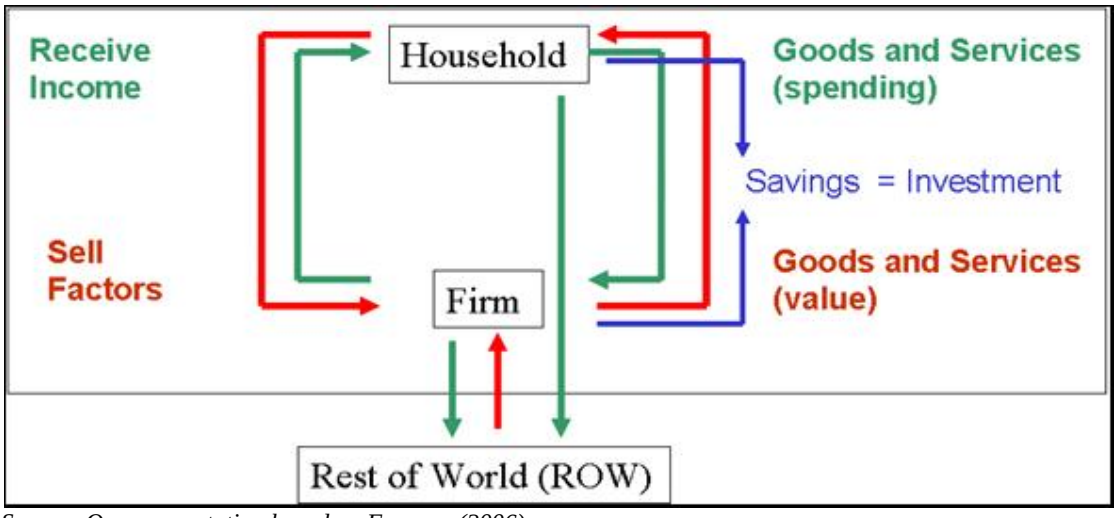
The single and multi-market models that have been discussed so far are referred to as partial equilibrium models because they do not account for what are referred to as general equilibrium effects. General equilibrium effects are the impacts that changes in prices and quantities on individual markets can have on all other variables within the economy, for example macro-economic variables such as the income, savings and investment. If the markets in question account for only a small share of total economic activity – as is the case for agriculture in many industrialized economies – general equilibrium effects can often be considered negligible. If Figure 3-1 depicted the EU oilseed market, for example, then one could safely assume that the increase in exports that results from the elimination of the export tax has no significant impact on any macro-economic variables because oilseed production and exports account for only a fraction of a percent of total economic activity in the EU. In other countries and settings, however, individual agricultural products or the sector as a whole can have significant macro-economic impacts. In the case of Ukraine, general equilibrium effects can be important in simulations of agricultural trade liberalization because food products account for over 50% of consumer expenditure. Hence, liberalization that reduces food prices will increase real incomes, with consequent effects on total spending, savings and investment in the economy.

To account for such general equilibrium effects, economists have developed CGE models. Figure 3-2 illustrates how computable general equilibrium models move beyond partial market analysis. Following a top-down approach, CGE models disaggregate the world into countries (or regions) and sectors, and within each country/region into households and firms. Private and public households sell factors such as labor to firms that use these factors to produce goods and services. These goods and services, in turn, are sold back to the households. These movements of factors, goods and services are depicted in red in Figure 3-2. Households receive income such as wages from firms in return for the factors they sell, and they use this income to buy goods and services, providing the firms with revenue. These flows of factor payments and sales revenues are depicted in green in Figure 3-2. Households can also purchase goods and services produced by foreign firms (imports), and domestic firms can also employ foreign factors and sell their goods and services abroad (exports). Furthermore, households save part of their income, and these savings can be channeled into investment undertaken by firms (depicted in blue in Figure 3-2).

The CGE framework depicted in Figure 3-2 divides the world into one country/region and the rest of the world (ROW). Depending on the use to which a model is to be put, this basic framework can be disaggregated. For example, ROW can be disaggregated into a number of

individual countries/regions, each with its own households and firms. Similarly, a CGE can be more or less disaggregated as regards factors and goods and services. Some CGEs consider only a few factors of production (e.g. labor and capital) and products (e.g. primary products, manufactures and services). Other CGEs consider additional factors of production (e.g. skilled vs. unskilled labor, land) and distinguish between a greater number of different types of production (e.g. they might divide primary production into agriculture, fisheries and mining).

Figure 3-2: The basic general equilibrium framework



Source: Own presentation based on Fugazza (2006).

As in single and multi-market models, the supply and demand of production factors, goods and services in a CGE is captured mathematically using functions and parameters. However, a CGE also includes restrictions that ensure that certain macro-economic accounting relationships hold. For example, one accounting relationship stipulates that households cannot spend more altogether than they earn in the form of factor incomes. In this way CGE models provide a theoretically consistent view of the economy. This view does not allow goods or monetary flows to come from 'nowhere'. Instead, in a CGE it is always possible to trace the amount of resources that have been used to produce a certain amount of goods, and it is always possible to determine exactly how many resources are freed e.g. as a result of trade liberalization, and which sectors absorb these resources. Therefore, if a policy change that is being modeled has important macro-economic repercussions, then CGE models, unlike partial equilibrium models, will be able to account for them.

III.3. The Global Trade Analysis Project (GTAP) modeling framework

III.3.1. The GTAP network

Developing applied trade models (partial or general equilibrium) that provide theoretically consistent and sufficiently realistic representations of an economy is a complex task. The more disaggregated a model is in terms of countries/regions, factors and products, the more detailed data and parameters are required to operate it. To provide useful simulation results for Ukraine-EU agricultural FTA scenarios, for example, a model must be able to depict both

Ukrainian and EU markets separately, and it should probably also be able to depict other important trading partners for Ukraine (e.g. Russia). Furthermore, it should also consider agriculture at a relatively high level of disaggregation, so that policy changes for individual agricultural products that are of importance to Ukraine (e.g. grain, oilseeds, milk, etc.) can be analyzed separately.

Over the years, many research teams have dedicated tremendous scientific resources to the development of applied trade models. Often, however, this work by different teams has been uncoordinated, which has both advantages and disadvantages. An element of competition between different modeling groups and models is useful because it can lead to innovation and ultimately the development of better models. However, lack of coordination can also mean duplication of effort. Furthermore, for many model end-users – such as policy makers – complex models are essentially 'black boxes'. When different models produce different results, policy makers and other users have scant basis for determining which results to trust more.

For our analysis of the potential impacts of a Ukraine-EU FTA, we have chosen to work with the Global Trade Analysis Project (GTAP) modeling framework. GTAP, at home at Purdue University in the United States, can be seen as a global effort to bundle the experience that has been accumulated in the field of applied trade modeling. Many countries have contributed to the GTAP project, and many different modeling approaches and data innovations are now part of GTAP. As a result of this effort, a common database and a multi-purpose, flexible general equilibrium trade model have been developed and are maintained and distributed through the GTAP centre. Almost 5000 members from all over the world are now part of the GTAP network, making it truly a global effort with the goal to constantly improve model-based trade analysis (GTAP 2008).

This by no means implies that all other models are inferior to GTAP. Rather, the GTAP network should be seen as a platform for communication. This platform links a peer group of experts who represent a large share of the combined experience in applied trade analysis that is currently available world-wide. This ensures that potential improvements in modeling techniques and data are subject to expert scrutiny and, if found useful, are rapidly made available to a large group of members worldwide. Transparency ensures that anyone can look into the GTAP 'black box' and decide for himself whether the model is useful or needs to be changed to enable a specific application. The size of the GTAP network ensures that many people are acquainted with the model and its strengths and weaknesses. In the present context, for example, World Bank experts who have worked extensively with GTAP in the past will be able to provide on-going quality control for the policy dialog on the Ukraine-EU FTA.

GTAP data and GTAP models are available in the two technically most advanced algebraic computer modeling languages: GEMPACK and GAMS. In addition, a wide range of technical extensions and special data collections are available through the GTAP network. Important examples are, for example, the carbon emissions database and the GTAP energy model that enable the analysis of trade policy changes within the political framework of global reduction in carbon emissions and CO_2 certificate trade. The network also facilitates discussions though yearly short courses and global conferences. In addition, new research teams frequently join the network and contribute new ideas and technical solutions.

III.3.2. The GTAP database: A joint, global effort

GTAP data are currently the most comprehensive and up-to-date data source for the purpose of applied trade policy analysis. We will be working with the GTAP-7 database. GTAP-7 is based on observed prices, trade flows and protection levels (applied, trade-weighted tariffs) from the year 2004. The entire world economy is represented in GTAP-7, but some countries are aggregated into supra-national regions. Altogether 105 individual geographical regions are represented, and in each of these regions up to 57 individual sectors can be modeled. Of the 57 sectors, 12 represent primary agricultural products, and 8 represent processed foods. This is, in comparison with many other CGE models, a relatively high level of agricultural disaggregation that makes it possible to consider detailed agricultural liberalization scenarios. Tables C1 and C2 in the Appendix C provide complete lists of the available regions and sectors in GTAP-7.

GTAP-7 is the first GTAP database that considers Ukraine, Kazakhstan, and Russia as separate countries, which is a significant advantage for our purposes. As is always the case when a country is added to the GTAP database, the GTAP centre has organized the collection, harmonization and compilation of the data for Ukraine into one single, consistent database, with the help of Ukrainian experts. Many other modeling frameworks do not consider Ukraine separately (but rather as part of some aggregate such as the 'Former Soviet Union'), and existing models that do consider Ukraine separately tend to be stand-alone models that have been developed for some specific application involving Ukraine but are not widely available and have not been subjected to the sort of scrutiny that the GTAP network provides.

III.3.3. The standard GTAP Model

The standard GTAP model is a comparative-static CGE model that assumes constant returns to scale and perfect competition in all markets. The model and all its equations are described in detail in Hertel (1997). The production side of this model is represented through a set of nested constant elasticity of substitution functions (CES). These functions combine primary and intermediate inputs for the production of final goods. Consumption of private households is modeled as a constant difference of elasticity (CDE) function.

Import demand follows the specification proposed by Armington (1969). According to this specification, a further set of nested CES functions determines to what extent imports from various sources substitute for one another to form bundles of imports, and to what extent these bundles of imports substitute for domestically produced goods to satisfy final demand. The Armington assumption implies that all traded goods in a category of products are weakly separable substitutes distinguished by country of origin. For instance, the Armington assumption implies that in tractors trade between Ukraine and the EU, 'EU tractors' constitute a slightly different product than 'Ukrainian tractors', and that consumers of tractors in either country choose between domestic versus imported tractors according to the exogenously specified Armington substitution parameter.

For many applications, the assumptions just mentioned provide a reasonable approximation of reality. In some instances, however they must be handled with care. For example, the Armington specification is a typical feature of modern CGE models. But it is based on parameters that are difficult to estimate, and it is known to have a strong impact on the results of trade policy simulations (Hess and von Cramon-Taubadel, 2008). In some cases, the

assumptions of perfect competition and/or constant returns to scale are questionable, and the GTAP platform allows them to be modified.

III.4. Conclusions

There is no one-fits-all solution to trade policy simulation. Instead, using a complex model for policy analysis requires a precise definition of the policy changes that are being considered, careful implementation of these policies in the model, and careful evaluation of simulation results. This is an iterative procedure that functions best when accompanied by an intensive dialog between policy makers and modelers.

For the purpose of analyzing Ukraine-EU FTA scenarios, a general equilibrium approach has important advantages, especially since the focus of the foreseen policy dialog will be on agriculture which accounts for a significant share of production, employment and consumer spending in Ukraine. The general equilibrium modeling framework developed by the Global Trade Analysis Project is a flexible and well-known tool for the assessment of trade policy changes. It also offers a comparatively high level of especially agricultural disaggregation. The most recent database that is available for this framework (GTAP-7) includes Ukraine for the first time, thus making GTAP ideally suited to the analysis of Ukraine-EU FTA issues in agriculture.

IV. Ukraine-EU FTA Outcomes: An Illustration of Stylized Results

IV.1. Introduction

The purpose of this chapter is to illustrate how the GTAP model introduced above can be employed in the course of a policy dialog Ukraine-EU trade liberalization in agriculture. It is intended to illustrate sorts of questions the model can be used to analyze, what sorts of results it can produce, and how these results can be interpreted.

It must be emphasized that the purpose of this paper is *not* to present simulated results for specific, realistic Ukraine-EU FTA scenarios. Instead, two stylized Ukraine-EU FTA scenarios are simulated using the GTAP model. These scenarios and results are meant to serve as a starting point to familiarize decision makers and administrative officials – especially those who are not experts in trade modeling or related quantitative analysis – with the model and its capabilities and limitations. These simulations are preliminary because important experimental settings have not yet been incorporated into the model. In particular, the commitments that Ukraine has made in order to join the WTO are not yet reflected in the initial tariff levels (compare Figure 3-1). Work that is described in the next chapter addresses this issue with a view to formulating a baseline and scenarios that provide a more realistic basis for the analysis of FTA options. Even in its present preliminary form, however, the model is able to highlight important topics and generate insights into fundamental issues that are at stake in Ukraine-EU FTA negotiations.

In the following section, the aggregation of the GTAP model and the policy scenarios that are analyzed are specified. Section 3 presents key results from the simulation of these scenarios, and Section 4 concludes. The Appendix B contains 4 tables that provide basic information about the Ukrainian agri-food sector as well as Ukraine agricultural trade.

IV.2. Specifying the GTAP model aggregation and the policy scenarios

IV.2.1. Aggregation

Before a simulation can be carried out, the modeler must make several decisions about key aspects of the model. One of these aspects concerns the level of sector and country/region aggregation. The 105 country/region and 57 sector GTAP-7 database can be adjusted to whatever level of aggregation the modeler chooses by combining countries/regions and sectors into corresponding aggregates using software that is part of the modeling package. For the scenarios presented below, an aggregation of the GTAP database into the 26 sectors outlined in Table 4-1 and the 27 countries/regions outlined in Table 4-2 has been chosen. The country/region aggregation has been chosen to depict most of Ukraine's important trade partners individually, and the sector aggregation is designed to take full advantage of all the agri-food products available in GTAP (only rice and processed rice are aggregated into one product) while simplifying the rest of the economy considerably. These aggregations can be modified in future applications of the model.

Table 4-1: The sector aggregation employed

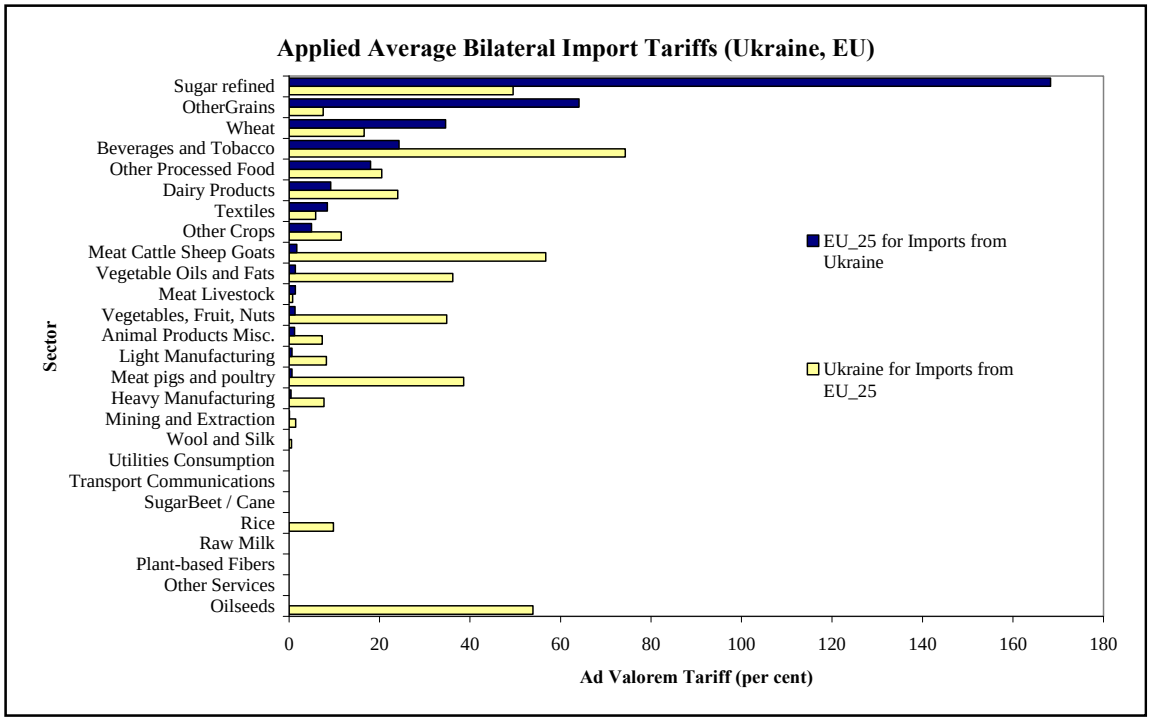
1. Rice paddy and processed	14. Animal products, miscellaneous
2. Wheat	15. Wool & silk
3. Other grains	16. Vegetable oils & fats
4. Vegetables, fruit, nuts	17. Sugar
5. Oilseeds	18. Other processed food products
6. Sugar beet and cane	19. Beverages & tobacco
7. Plant-based fibers	20. Textiles and wearing apparel
8. Other crops	21. Extraction
9. Livestock	22. Light manufacturing
10. Raw milk	23. Heavy manufacturing
11. Meat: cattle, sheep, goats, horses	24. Utility and consumption
12. Meat: pork & poultry	25. Transport & communication
13. Dairy products	26. Other services

Table 4-2: The country/region aggregation employed

1. Oceania	15. Bulgaria
2. East Asia	16. Romania
3. South East Asia	17. Croatia
4. South Asia	18. Albania
5. North America	19. Rest of Eastern Europe
6. Latin America	20. Kazakhstan
7. Iran	21. Kyrgyzstan
8. Middle East and North Africa	22. Armenia
9. Sub Sahara Africa	23. Russia
10. Switzerland	**24. Ukraine**
11. Turkey	25. Azerbaijan
12. Rest of EFTA	26. Georgia
13. Rest of Europe	27. Rest of Former Soviet Union
14. EU_25	

Given the aggregation in Tables 4.1 and 4.2 has been chosen, GTAP-7 calculates the bilateral *ad valorem* tariffs depicted in Figure 4-1. Figure 4-1 shows for each sector the tariffs levied by the EU on imports from Ukraine, and vice-versa the import tariffs that Ukraine levies on imports from the EU. These *ad valorem* tariff rates are calculated according to a trade-weighting procedure that combines applied tariffs from the MacMap tariff database into the much more aggregated scheme of the GTAP database. Prior to the simulation of more detailed and more realistic scenarios in subsequent work, these tariffs will checked carefully and updated to account for Ukraine's WTO accession commitments (see chapter VI below).

Figure 4-1: Applied tariffs between the EU and Ukraine at the chosen level of aggregation



Source: Own calculations.

IV.2.2. Scenarios

Scenario 1 assumes that the EU and Ukraine uniformly reduce the tariffs displayed in Figure 4-1 by 50%. These simulated tariff cuts are undertaken at a percent rate, implying that all tariffs, regardless their initial level, are reduced by the same 50% rate. Hence, a tariff of 80% is reduced to 40%, while a tariff of 20% is reduced to 10%. To avoid confusion, percent rate cuts must be distinguished from percentage point cuts according to which, for example, a cut of 50 percentage points reduces a tariff of 80% to 30%, while an initial tariff of 50% is reduced to zero. Confusion can also arise when reductions in the so-called power of tariffs are discussed in trade negotiations. A tariff of 80% has a power of 1.8. A 50% rate cut will reduce this tariff to 40%, and its power to 1.4; i.e. the power of the tariff is reduced by 22%.

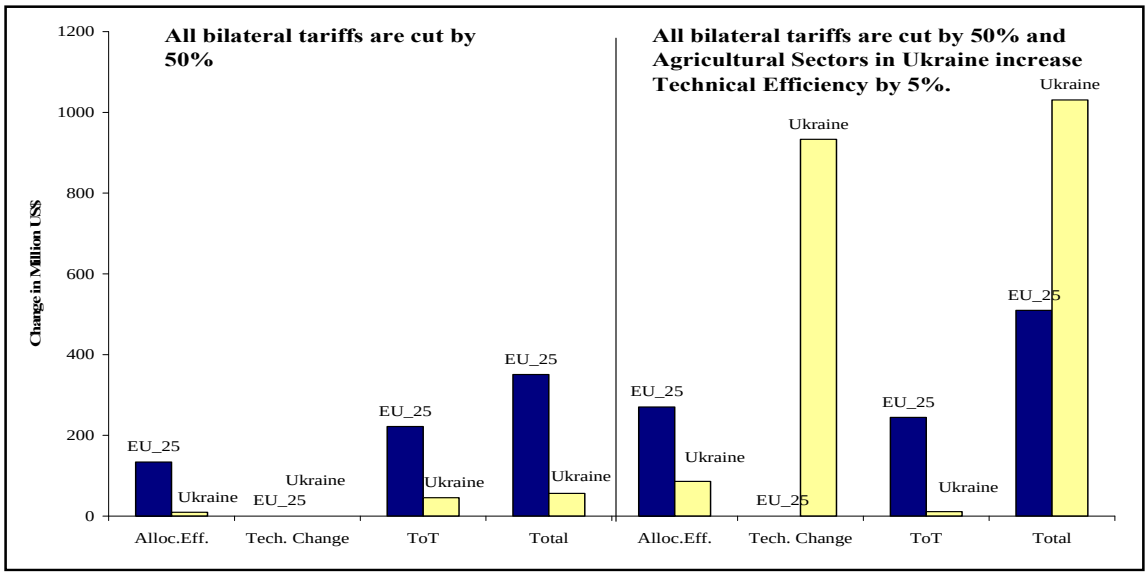
Scenario 2 differs from Scenario 1 in only one respect; it assumes that over the simulation horizon of approximately 3-5 years Ukraine improves the technical efficiency of its agricultural production by 5%. This means that by the end of the simulation horizon, Ukraine is able to produce 5% more output from a given volume of inputs than before. This is implemented in the model through a shock to output that augments technical change by 5%. Scenario 2 is therefore a very stylized attempt to address the fact that Ukrainian agriculture is known to have a large potential for improvements in efficiency and productivity. At first glance, productivity issues appear unrelated to the question of an FTA with the EU. However, Scenario 2 provides a means of analyzing other measures that policy makers in Ukraine can use, along with trade policy, to influence the development of domestic agriculture. Trade liberalization will increase the exposure of Ukrainian farmers to international competition and

therefore increase the importance of measures that enhance their productivity. Important domestic measures that could contribute to a 5% increase in technical efficiency include increased investments in agricultural research and education, improved extension services, investments in storage and transport facilities for agricultural products, etc.

IV.3. Results

The results from scenario 1 show that Ukraine and the EU can expect moderate gains from a 50% reduction in all bilateral tariffs (left panel of Figure 4-2). In Figure 4-2, the welfare benefits of tariff reduction are measured in million US$. In absolute terms the EU benefits more, but measured in terms of GDP (not displayed in Figure 4-1), Ukraine clearly benefits the most as its economy is considerably smaller than that of the EU. Figure 4-2 also breaks down the total welfare benefits into allocative efficiency (benefits due to a better use of domestic resources following the removal of tariff distortions), technical change (benefits due to any additional changes in productivity that are assumed to take place), and terms of trade (TOT; benefits due to higher prices received by exporters and lower prices paid by importers following tariff reduction). Figure 4-2 shows that TOT gains outweigh gains from a more efficient allocation of resources between sectors in both countries. For example, Ukraine, which is a net importer of agricultural machinery, benefits from the fact that it pays less for the machinery that it imports from the EU following tariff reduction, while the EU benefits from lower prices for the feed grains that it imports from Ukraine.

Figure 4-2: Simulated welfare effects from scenario 1 (left) and scenario 2 (right)



Source: Own calculations.

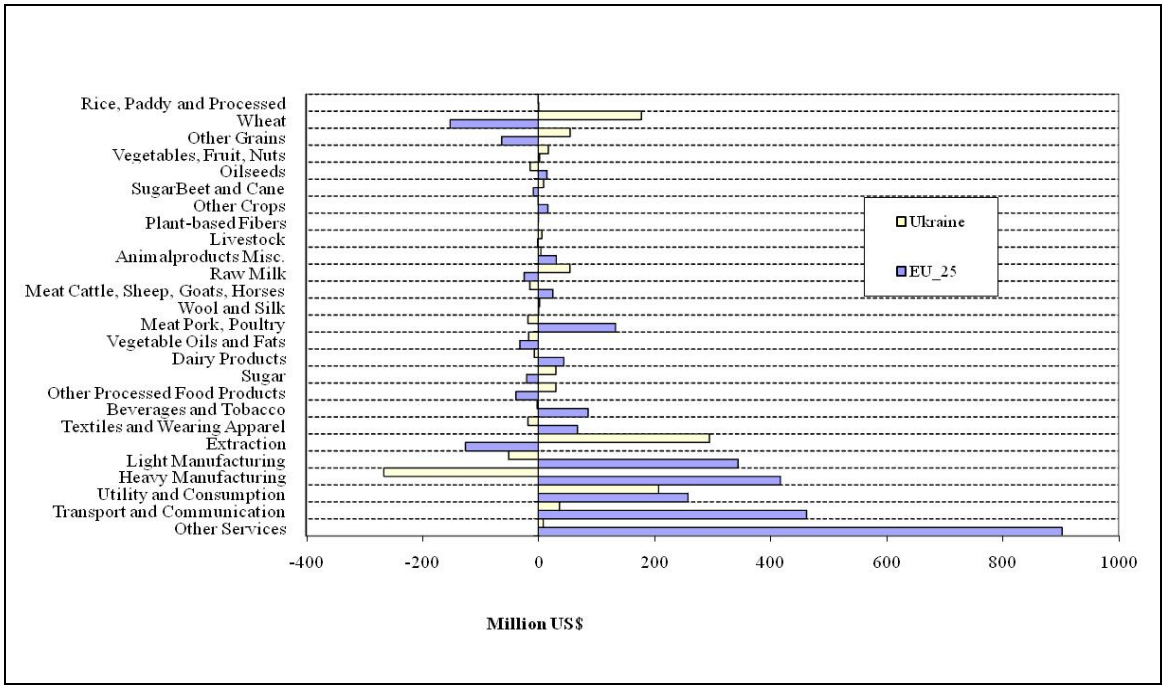
Scenario 2 highlights the result that trade liberalization would be more beneficial if it was accompanied by domestic reforms that enhance the productivity of potentially competitive industries. In other words: productivity-enhancing policies can provide lever which multiplies the gains from trade liberalization. In scenario 2 the assumed 5% increase in technical change in agriculture makes Ukraine benefit much more from tariff reduction than is the case in scenario 1.

Figure 4-2 shows that these benefits of technical change outweigh allocation and TOT benefits for Ukraine. However, allocative benefits for Ukraine do increase in scenario 2 vis-à-

vis scenario 1: the more productive Ukrainian agriculture is, the more damage is done by tariffs that distort the allocation of resources by making less productive sectors artificially profitable, and the greater the benefit of reducing these tariffs. Interestingly, Figure 4-2 shows that the EU also has an interest in improvements in the productivity of Ukrainian agriculture. The gains for the EU are significantly higher under scenario 2 than under scenario 1, again because tariff reduction leads to greater allocative benefits when Ukrainian agriculture is more productive.

Figure 4-3 presents information on the changes in production by sector that would result from the 50% reduction in bilateral tariffs in scenario 1. Focusing on agriculture, the most striking impact is an increase in wheat and other grains production in Ukraine, mirrored by corresponding reductions in production in the EU. Availability of cheaper imported grains in the EU stimulates livestock production there, especially pork and poultry.

Figure 4-3: Simulated changes in the value of output by sector as a result of scenario 1 (50% reduction in all bilateral tariffs)



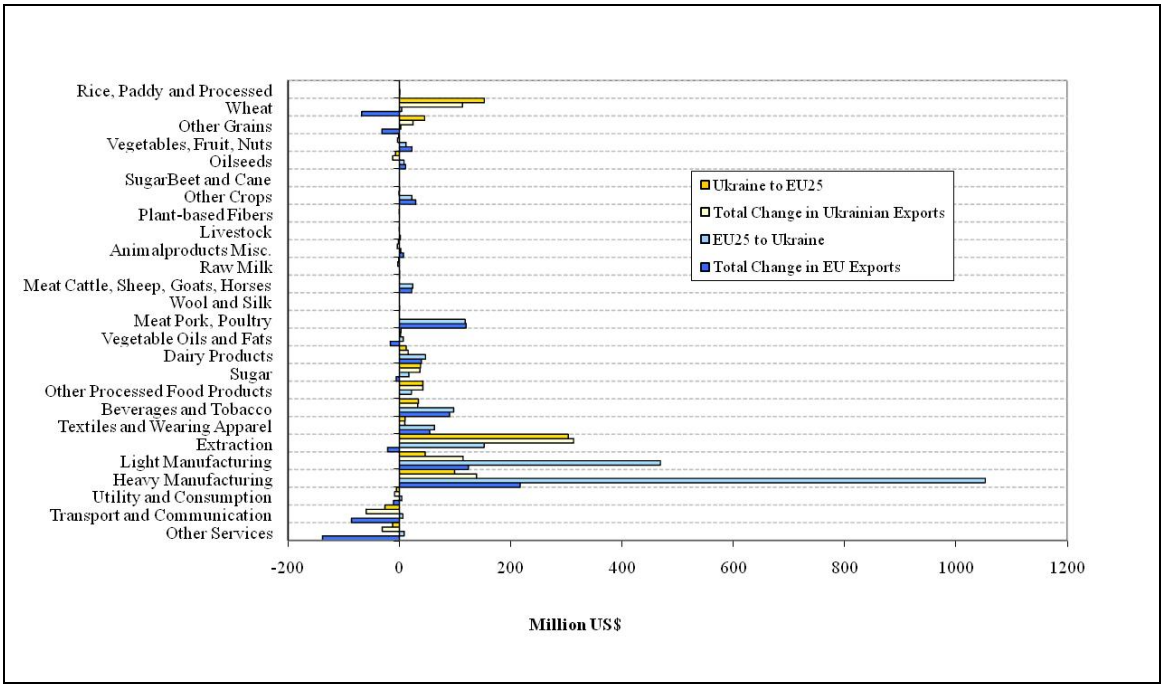
Source: Own calculations.

Figure 4-4 presents simulation output for changes in exports as a result of scenario 1. Changes in Ukraine's export to the EU and in Ukraine's total exports for each sector are presented, as are changes in the EU's exports to Ukraine and in total EU exports. Corresponding to the output changes in Figure 4-3, Ukrainian exports of wheat and other grains to the EU increase. Note, however, that the total increase in Ukraine's wheat and other grains exports is less than the increase in exports of these products to the EU. This indicates that bilateral tariff reduction between the EU and Ukraine leads to what is referred to as trade diversion. Some of the additional exports of wheat and other grains to the EU come at the expense of exports to other destinations that become relatively less attractive customers for Ukraine once the EU lowers its import barriers. Especially large trade diversion effects can be seen in the case of EU exports of light and heavy manufacturing goods, where exports from the EU to Ukraine increase by much more than total EU exports.

IV.4. Conclusions

The results presented above are illustrative and preliminary. First, much more detail could be provided. For example, the changes in trade flows in Figure 4-4 could be broken down to provide more information on flows to and from individual third countries (e.g. Russia). Similarly, the information on output value changes in Figure 4-3 could be decomposed into quantity and price effects. Second, the tariff data in the model have not yet been adjusted to the levels that will prevail after Ukraine's WTO accession.

Figure 4-4: Simulated changes in Ukrainian and EU exports by sector as a result of scenario 1 (50% reduction in all bilateral tariffs)



Source: Own calculations.

Some second-best effects have not been evaluated. Second-best effects play a role when the removal of distortions on one market has an impact on the magnitude of distortions on other market. For example, if output subsidies are in place for livestock production, then reducing import tariffs for grains (which serve as intermediate inputs for livestock) will lead to an expansion in livestock production. This, in turn, will draw even more subsidies and other resources into livestock production and away from more competitive sectors, leading to a loss in allocative efficiency. In some situations, this loss can outweigh the benefits of the initial grain tariff reduction. Due to second best effects, trade policy changes can have important implications for other aspects of agricultural policy.

Despite these limitations, the results presented here provide first insights into the use of computer-based simulation models as a tool for assessing the consequences of trade liberalization. They indicate that both Ukraine and the EU would benefit from trade liberalization. They highlight the importance of improving the productivity of Ukrainian agriculture so that Ukraine is able to draw the greatest possible benefit from the opportunities provided by increased access to EU markets, and to stand up better to the increased competition that goes hand-in-hand with this increased access

V. A General Equilibrium Assessment of the Impact of WTO Accession on Ukrainian Agriculture

V.1. Introduction

On May 16, 2008, Ukraine became a member of the WTO. In this chapter we provide a numerical assessment of the impact that WTO accession will have on agriculture in Ukraine. The previous two chapters have introduced the GTAP modeling framework as a publicly available analytical tool that is widely used by trade economists and governments around the world as a standard platform for systematic, numerical trade policy analysis. An assessment of the impact of WTO accession on agriculture in Ukraine is clearly interesting in its own right. However, the modifications to the GTAP model that are required to generate this assessment are also important for future work on FTA scenarios, because whatever is agreed to between Ukraine and the EU in their FTA negotiations will take the post-WTO accession situation in Ukraine as a starting point. In the following Section 2 we outline the data preparations and projections that are needed to establish a realistic baseline, and the formulation of WTO accession scenarios. In Section 3, simulation results are presented and discussed. Section 4 concludes. A detailed Appendix D with a broader selection of sectoral and national simulation results is also provided.

V.2. Establishing a realistic baseline and relevant policy scenarios

V.2.1. Adjusting GTAP-7 for an analysis of Ukraine's WTO accession

To simulate the impact of a trade policy change such as WTO accession, modelers compare two scenarios. The first is the baseline scenario which depicts the situation that is expected if the trade policy change does not take place. The second is the change scenario that depicts the situation that is expected if the trade policy change does take place. The difference between the baseline and the change scenarios is attributed to the trade policy change. This type of analysis is often referred to as 'comparative static' because it involves comparing two static 'snapshots' of an economy, one with and one without a policy change. In the present context, for example, we wish to compare scenarios that simulate the Ukrainian economy with and without WTO accession, to see what impact accession is expected to have on key variables such as production, prices and trade.

The GTAP-7 pre-release data that we are using are a consistent input-output database account of the world economy and benchmarked to the base year 2004. Thus, these data, although they are the currently most up-to-date source for modeling of larger trade policy changes, do not take Ukraine's recent WTO commitments into account. Instead, the GTAP-7 data reflect applied tariffs, production and trade volumes from around the year 2004. Ratification of WTO accession is expected to take place in Ukraine in mid-2008. Therefore, to establish a realistic baseline, changes that have taken place in the Ukrainian economy and the rest of the world since 2004 have to be incorporated into the GTAP-7 data.

Starting from the GTAP-7 base data, the world economy is projected according to regional growth rates between 2004 and 2008. Growth rates for this projection (GDP and population) are obtained from the World Bank**.** The result is baseline data that approximates the size of the world economy in 2009. Into this baseline we also incorporate updated applied tariffs[4] and trade flows to reflect changes that have taken place in Ukraine and elsewhere since 2004. This **baseline** thus constitutes an updated database that reflects the economic situation in Ukraine and the rest of the world as they would likely be at the time of expected accession in 2009.

V.2.2. Policy scenarios

Altogether, four WTO accession scenarios are compared with the baseline described above. These scenarios are labeled 1a and 1b, and 2a and 2b. Table 5-1 summarizes the experimental setting and these scenarios.

- Scenario 1a – Immediate accession commitments (IAC): In this scenario, applied tariffs are reduced for all products to the bound rates specified in Ukraine's initial WTO accession commitments that would presumably take effect in 2009.
- Scenario 1b – IAC plus technical change: This scenario is identical to Scenario 1a except that it also assumes (similar to the simulations presented in chapter V) a 5% improvement in technical efficiency in Ukrainian primary agriculture.
- Scenario 2a – Final accession commitments (FAC): This scenario takes the results of scenario 1a as a baseline and simulates the additional impact of the full implementation of all of Ukraine's WTO accession commitments that are scheduled to occur by 2013.
- Scenario 2b – FAC plus technical change: Analogous to Scenario 1b, this scenario is identical to Scenario 2a except for the assumption of an additional 2% improvement in technical efficiency in Ukrainian primary agriculture relative to the IAC scenario 1b. Thus, results from this scenario 2b include in total a simulated technical efficiency change of 5% + 2% = 7% relative to the baseline 2009.

Scenarios 1a and 2a therefore model the impact of the commitments that Ukraine has made in order to join the WTO in two steps, while 1b and 2b are corresponding stylized attempts to address the fact that Ukrainian agriculture is known to have a large potential for improvements in efficiency and productivity. As discussed in chapter V, the scenarios with technical change assumptions provide an indirect means of analyzing other measures that policy makers in Ukraine can use, along with trade policy, to influence the development of domestic agriculture. Trade liberalization will increase the exposure of Ukrainian farmers to international competition, and will therefore increase the importance of measures to enhance their productivity. Important domestic measures that could contribute to an (modest) increase in technical efficiency of 5% + 2% = 7% by the time that all WTO commitments have been implemented after 2013 include increased investments in agricultural research and education, improved extension services, investments in storage and transport facilities for agricultural products, etc.

[4] Updating tariffs is a complex process that involves taking information on tariffs at the HS10 level and aggregating it to match the 56 products groups that are defined in GTAP. More information on this process is presented in Appendix A.

Table 5-1: Simulation steps undertaken to assessment Ukraine's WTO accession.

GTAP-7 data	Baseline 2009	Effect of Ukraine's immediate accession commitments (IAC)	Effect of Ukraine's final accession commitments (FAC)
Applied tariffs for all sectors of the world economy, base data year 2004. Ukraine's WTO commitments not included.	All countries/ regions projected to 2009 according to observed and projected regional growth rates. Applied HS6 tariffs for Ukraine aggregated to GTAP sectors.	**Scenario 1a – IAC:** Applied tariffs in baseline 2009 cut according to Ukraine's immediate accession commitments anticipated in 2009. If WTO commitments are not binding for a specific product, the corresponding baseline tariff applies. **Scenario 1b – IAC + TC:** As Scenario 1a, but in addition it is assumed that Ukraine improves its productivity in agriculture by 5%.	**Scenario 2a – FAC:** Applied tariffs in Scenario 1a are cut further to fulfill Ukraine's final accession commitments, scheduled to take place by 2013 (earlier for some products). **Scenario 2b – FAC + TC:** As Scenario 2a, but in addition it is assumed that Ukraine improves its productivity in agriculture by 2%.

V.2.3. Aggregation

Before a simulation can be carried out, the modeler must make several decisions about key aspects of the model. One of these aspects concerns the level of sector and country/region aggregation. Some aggregation is unavoidable, because standard personal computers are, despite ongoing technical advances, not able to solve the GTAP model with a full disaggregation of 57 sectors and 105 countries/regions. Furthermore, for most applications, the full disaggregation would provide unnecessary detail that obscures key issues. For the scenarios presented below, an aggregation into the 27 countries/regions outlined in Table 5-2 has been chosen. The sectors have been retained at the most disaggregated level possible (57 sectors, see Table 5-3) in order to provide as much information as possible on changes within Ukrainian agriculture and the rest of the Ukrainian economy.

Table 5-2: The country/region aggregation employed

1. Oceania	15. Bulgaria
2. East Asia	16. Romania
3. South East Asia	17. Croatia
4. South Asia	18. Albania
5. North America	19. Rest of Eastern Europe
6. Latin America	20. Kazakhstan
7. Iran	21. Kyrgyzstan
8. Middle East and North Africa	22. Armenia
9. Sub Sahara Africa	23. Russia
10. Switzerland	**24. Ukraine**
11. Turkey	25. Azerbaijan
12. Rest of EFTA	26. Georgia
13. Rest of Europe	27. Rest of Former Soviet Union
14. EU_25	

Table 5-3: The agricultural sector aggregation employed (sectors in bold type are subject to the simulated increases in productivity in scenarios 1b and 2b)

1.	Rice paddy and processed	14.	Animal products, miscellaneous
2.	Wheat	15.	Wool & silk
3.	Other grains	16.	Vegetable oils & fats
4.	Vegetables, fruit, nuts	17.	Sugar
5.	Oilseeds	18.	Other processed food products
6.	Sugar beet and cane	19.	Beverages & tobacco
7.	Plant-based fibers	20.	Forestry
8.	Other crops	21.	Fisheries
9.	Livestock		
10.	Raw milk	In addition: 36 sectors industry and services. Results for these sectors are not discussed in detail in this paper but can be found in Appendix D.	
11.	Meat: cattle, sheep, goats, horses		
12.	Meat: pork & poultry		
13.	Dairy products		

V.3. Results: WTO accession and agriculture in Ukraine

The GTAP model generates a huge range of outputs including simulated changes in production and trade for each combination of products and country/regions, and simulated changes in input use for each product in each country/regions. The scenarios simulated here produce literally hundreds of thousands of numbers, far too many to be discussed exhaustively in the available space. In the following we present and interpret a number of key results that provide policy makers with a sound quantitative overview of key strategic issues. Appendix D contains tables that present a selection of more detailed results. These tables and others that can be extracted from GTAP can provide a basis for in-depth analysis of specific WTO accession impacts (i.e. employment and input use changes in individual sectors, changes in trade flows between specific countries for individual products).

V.3.1. Regional and global effects

Table 5-4 presents the sources of simulated aggregate changes in economic welfare as a result of WTO accession (figures are measured in million US$ unless stated otherwise). As outlined in chapter V, Table 5-4 breaks the total welfare changes down into changes due to allocative efficiency (benefits due to a better use of domestic resources following the removal of tariff distortions), technical change (benefits due to any additional changes in productivity that are assumed to take place), and terms of trade (benefits due to higher prices received by exporter and lower prices paid by importers following tariff reduction). The following key results are of note:

First, Table 5-4 only contains results from Scenarios 1a and 1b (impact of immediate accession commitments) because the corresponding results for Scenarios 2a and 2b (final accession commitments, not shown) are almost identical.

Table 5-4: Simulated economic benefits due to Ukraine's WTO accession

Country/region	*Scenario 1a: IAC*	*Scenario 1b: IAC+5% productivity change*	*Scenario 1a: IAC*	*Scenario 1b: IAC+5% productivity change*	*Scenario 1a: IAC*	*Scenario 1b: IAC+5% productivity change*
	Allocative efficiency	*Allocative efficiency*	*Technical efficiency*	*Technical efficiency*	*Terms-of-trade*	*Terms-of-trade*
Oceania	-0,05	-0,04	0	0	-0,43	-10,93
East Asia	-1,30	5,76	0	0	-5,48	14,50
South East Asia	-0,36	-0,27	0	0	-1,78	-1,51
South Asia	-0,23	1,88	0	0	-2,64	-4,91
North America	-0,44	14,34	0	0	-18,58	-46,38
Latin America	0,79	0,33	0	0	39,21	18,41
EU 25	-23,84	52,15	0	0	-9,80	18,49
Middle East & N. Africa	3,57	19,61	0	0	11,00	34,19
Sub Sahara Africa	0,38	-0,19	0	0	1,51	0,25
Russia	-3,65	0,42	0	0	31,60	40,24
Ukraine	**72,69**	**97,58**	**0**	**517,49**	**-71,60**	**-104,12**
Rest of Eastern Europe	0,46	0,32	0	0	8,66	14,88
Rest of FSU	0,07	0,26	0	0	0,83	-0,32
Armenia	-0,31	-0,44	0	0	1,09	1,72
Azerbaijan	-0,19	-0,24	0	0	1,54	1,79
Georgia	-0,10	0,10	0	0	2,36	4,69
Iran	-0,71	-0,56	0	0	-0,53	1,57
Turkey	1,18	3,55	0	0	5,04	7,71
Kyrgyztan	-0,03	-0,04	0	0	0,10	0,16
Kazakhstan	-0,59	-0,28	0	0	1,86	0,90
Switzerland	1,30	3,41	0	0	0,71	3,37
Rest of EFTA	0,78	1,44	0	0	4,33	4,56
Albania	-0,07	-0,04	0	0	-0,14	0,02
Bulgaria	0,40	0,46	0	0	1,64	1,08
Croatia	0,00	0,14	0	0	-0,26	-0,65
Romania	0,21	0,20	0	0	0,17	1,23
Rest of Europe	-0,34	-0,34	0	0	-0,54	-1,25
Total	49,64	199,53	0,00	517,49	-0,11	-0,33

This implies that most of the impact of WTO accession will be triggered by the immediate commitments that are anticipated to be implemented in 2009, and that the later commitments that are implemented after 2009 through to 2013 will have comparatively small impacts.

Second, the results from Scenario 1a in Table 5-4 show that Ukraine can expect moderate gains from WTO accession due to a more efficient allocation of its domestic resources. Both primary inputs (such as land, capital, skilled and unskilled labor) and intermediate inputs (such as fertilizer, pesticides and machinery, both from domestic and imported sources) move from less to more competitive sectors and branches of the economy as a result of trade liberalization. As is discussed in greater detail below, this spurs Ukrainian production of some key agricultural products (e.g. wheat, other grains, oilseeds), but also of some processed food products, (such as beef, sheep and goat meat, and dairy products), which benefit from less expensive intermediate inputs.

However, third, allocative gains are largely offset by terms of trade losses that occur in the form of falling prices for Ukrainian exports of grains, vegetable oils and some processed foods such as dairy products and beef, sheep and goat meat. The cause of these losses is that Ukraine is economically speaking a 'large country' for these products. If Ukraine produces

and exports more wheat as a result of allocative improvements that are triggered by WTO accession, then prices for wheat on world markets will fall as a result, offsetting some of the allocative efficiency gains.

In the case of processed products such as beef and milk it may sound odd that Ukraine is a 'large country' because it actually has quite a small share of overall world trade. For these products, however, questions of quality and product differentiation play an important role. Table 5-5 helps to explain this issue. Table 5-5 highlights seven product groups that together account for 66% of the total terms of trade loss in Scenario 1a. As the export share data in Table 5-5 illustrate, Ukraine's exports of these products are concentrated on a small number of destinations. Russia plays an especially important role, absorbing 54% of Ukraine's dairy product exports, and 94% of Ukraine beef, sheep and goat meat exports, and 41% of Ukraine's exports of other food products. Many of the exports in question can only be exported to Russia and some other FSU countries because they fail to meet quality standards in other markets such as the EU.

Table 5-5: Identifying the main sources of Ukraine's terms of trade losses due to WTO accession in Scenario 1a

Product group	**Share of terms of trade loss (%)**	**Share of destination in Ukrainian exports of the product in question**			
		EU 25	Russia	Turkey	Switzerland
Food products nec	18.50	13.2	40.9	3.3	0.3
Dairy products	16.76	18.8	54.3	0.7	0
Vegetable oils and fats	10.40	33.2	12.8	5.2	16.6
Beverages and tobacco products	7.51	10.6	56.8	2.2	0.1
Forestry	5.78	45.4	0.1	44.8	0
Meat: cattle, sheep, goats, horse	5.20	2.9	94.1	0	0.1
Cereal grains nec	2.31	11.8	10.1	4.7	0
Sum: Share of total ToT loss	66.47				

When Ukrainian production of these products increases due to increased allocative efficiency, exports to Russia increase further and prices there fall, generating negative terms of trade effects. If Ukraine's export structure was more diversified, increased production and exports could be spread over a larger number of markets and would not generate such large negative terms of trade effects. Indeed, if the GTAP model is manipulated in a way that permits a diversification of Ukraine's export structure, the terms of trade losses in the WTO accession scenarios quickly turn into gains.[5] This highlights the great importance of adopting internationally accepted quality standards and certification systems. The benefits of WTO accession especially for processed food products will largely hinge on whether Ukraine succeeds in this regard.

A similar source of terms of trade losses for Ukraine is the structure of its imports: Table 5-4 indicates that especially Latin America experiences a positive terms of trade effect as a result of Ukraine's WTO accession (Scenario 1a). Latin America currently supplies a large share of Ukraine's imports of processed meat, and Ukraine's tariff cuts due to WTO accession are substantial for these import flows (-41%; see Table D1 in Appendix D). Therefore, Ukraine's

[5] This can be demonstrated by adding to the GTAP model an exogenous import augmenting technical change shock for countries other than Ukraine's current main trading partners for the products in question. Detailed results are not shown here but are available from the authors on request.

demand for imports of processed meat products from Latin America will increase as a result of WTO accession, causing terms of trade to improve for Latin America due to rising prices for meat exports to Ukraine. This, however, also implies a deterioration of Ukraine's terms of trade with regard to Latin America.

Fourth, the simulated benefits in Table 5-4 are relatively small in absolute terms. This is not surprising because Ukraine already has quite low tariffs for most products and WTO accession will therefore not lead to many major changes in protection. However, these benefits do not account for growth effects that are likely to occur as a result of WTO accession. Such effects include technological spillovers from intensified trade in specific sectors, capital accumulation, and the facilitation of trade and investment. For these reasons, the simulation results presented here constitute a conservative, lower bound estimate of overall WTO accession effects on the Ukrainian economy.

Fifth and finally, Scenario 1b highlights the fact that trade liberalization is much more beneficial if it is accompanied by domestic reforms that enhance the productivity of potentially competitive industries. In Scenario 1b the benefits of the assumed 5% increase in agricultural productivity outweigh allocation and terms of trade effects of WTO accession considerably. Gains from a 5% improvement of agricultural productivity would amplify gains from a more efficient allocation of resources after WTO accession by more than 30%. Furthermore, technical efficiency gains would be five times larger than the corresponding terms of trade losses.

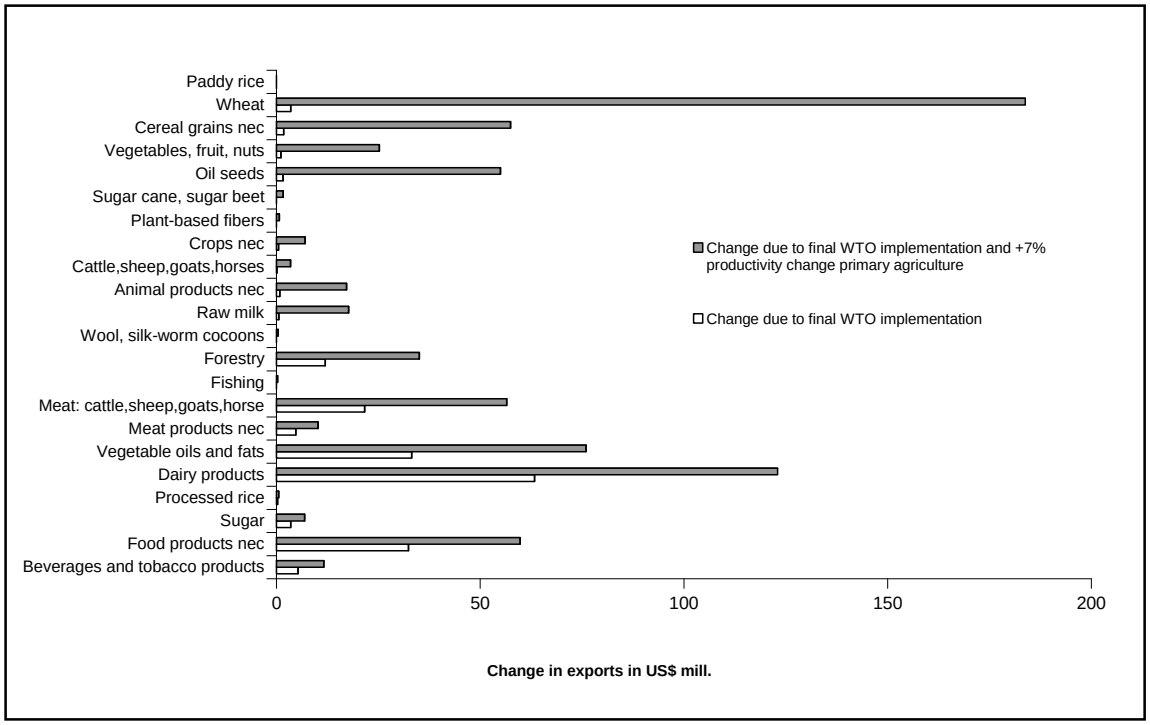
V.3.2. Sectoral effects in Ukrainian agriculture – trade

In Figure 5-1, changes in Ukraine's export volume in million US$ after completion of final accession commitments (Scenarios 2a and 2b) are presented for each sector. We see that Ukrainian exports of wheat and other grains increase because of the allocative gains caused by tariff cuts. At the same time, the volume of exports for processed foods increases because prices for intermediate inputs from domestic and imported sources decline, which makes these products relatively more competitive on their export markets. However, as outlined above, this leads to negative terms of trade effects unless Ukraine is able to diversify its export structure and reduce its dependence especially on Russia as a destination for key processed food products.

Figure 5-2 takes import changes into account as well and summarizes changes in Ukrainian net trade for agricultural products after final implementation of all WTO commitments. These changes all refer to Ukraine's initial net trade position of Ukraine in the 2009 baseline (for reference, see Figure D1 in the Appendix D). Across all agricultural products, exports and net exports increase as a result of WTO accession (with the exception of beef and other meat); in most cases increases in exports and net exports are considerably larger if additional technical change is assumed. Indeed, increased production efficiency together with WTO accession instead would significantly increase Ukraine's net exports of all major agricultural and food products, with the strongest increase projected for wheat exports.

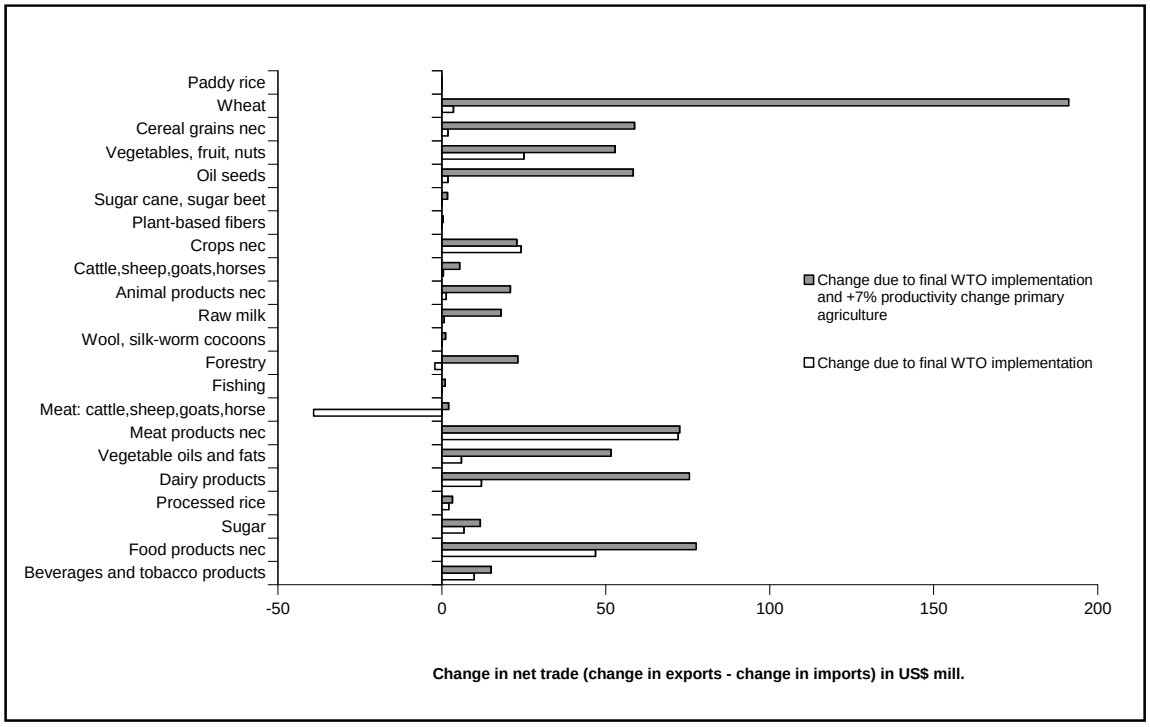
Figure 5-3 shows what changes in Ukraine's net trade with other countries/regions would result from the changes in net exports depicted in Figure 5-2. The main export growth is towards the EU, North America and Russia, while imports from South America (mainly processed meat products) increase by roughly 150 million US$.

Figure 5-1: Simulated changes in the value of agricultural exports due to implementation of final accession commitments (Scenarios 2a and 2b) in million US$



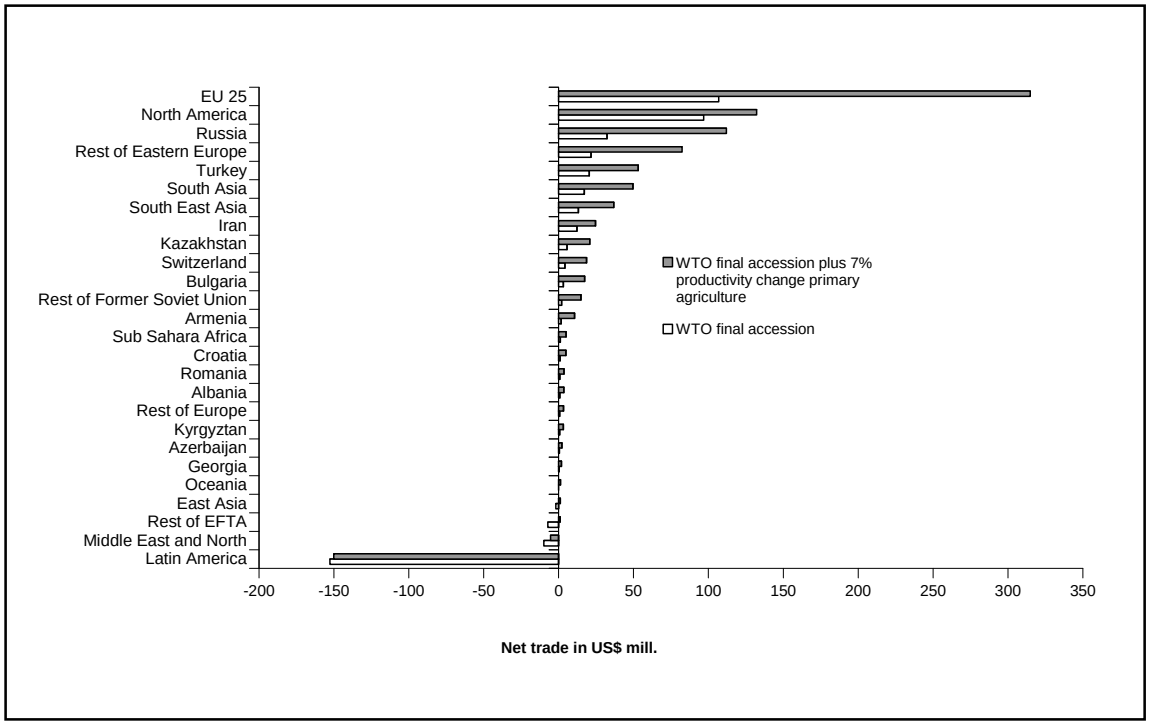
Source: Own calculations.

Figure 5-2: Simulated changes in Ukrainian net agricultural trade due to implementation of final accession commitments (Scenarios 2a and 2b) in million US$



Source: Own calculations.

Figure 5-3: Simulated changes in Ukrainian net trade (change in exports – change in imports) by region as a result of scenario 1 and 2 (final WTO accession) in million US$



Source: Own calculations.

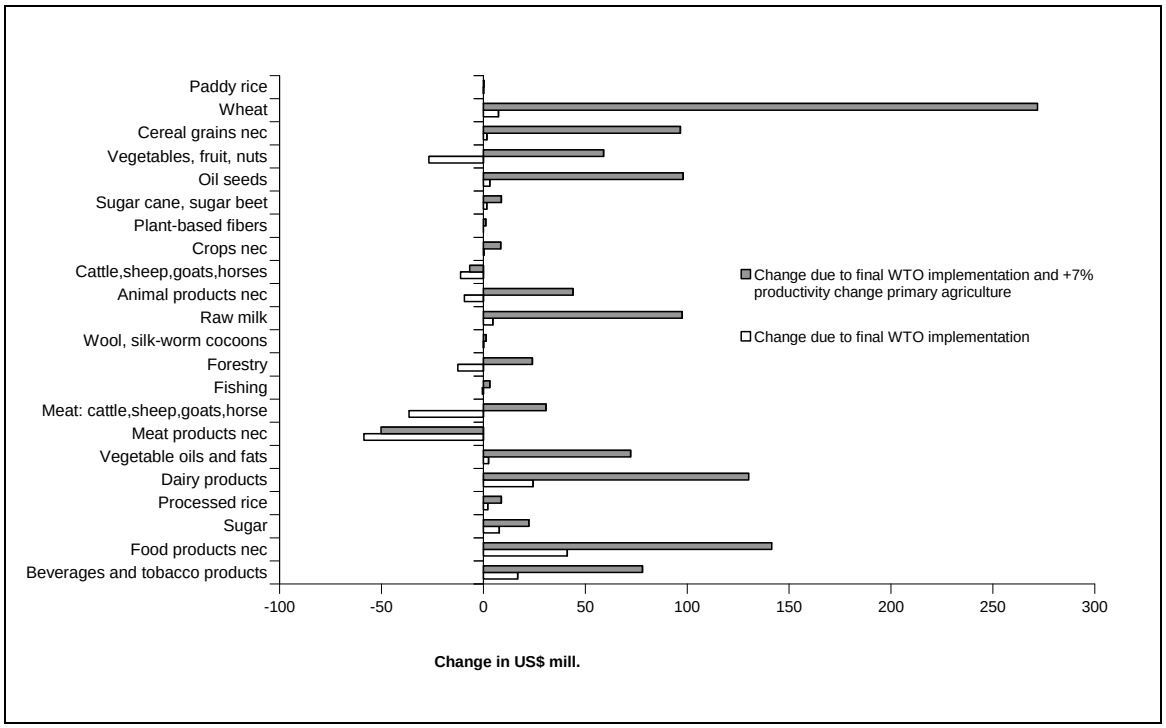
V.3.3. Sectoral effects in Ukrainian agriculture – output and domestic consumption

Figure 5-4 presents simulation results for changes in the value of output as a result of Scenarios 2a and 2b. The output of most agricultural products increases as a result of WTO accession, especially in Scenario 2b with additional technical change. However, in Scenario 2a without additional technical change, output of fruits and vegetables, beef, sheep- and goat meat, and the category 'meat products nec' (largely pork and poultry) falls, and in the latter category output falls even with additional technical change.

What would be the impact of these changes on the domestic market for food products in Ukraine? Figure 5-5 displays the simulated change in the composition of domestic consumption as a result of WTO accession (Scenario 1a). Consumption changes as a result of WTO accession because the relative prices of product change, causing consumers to shift their expenditure from products that become relatively more expensive to those that become less so. Consumption also changes because trade liberalization changes income levels, and as incomes grow, consumption typically shifts away from staple foods such as grains to livestock products such as meat and milk.[6]

[6] Consumption also changes if consumers' preferences change, even if prices and incomes remain unchanged. Preferences are assumed to be constant in the simulations presented here, however.

Figure 5-4: Simulated changes in the value of output by sector in Scenarios 2a and 2b (final implementation of WTO commitments) in million US$

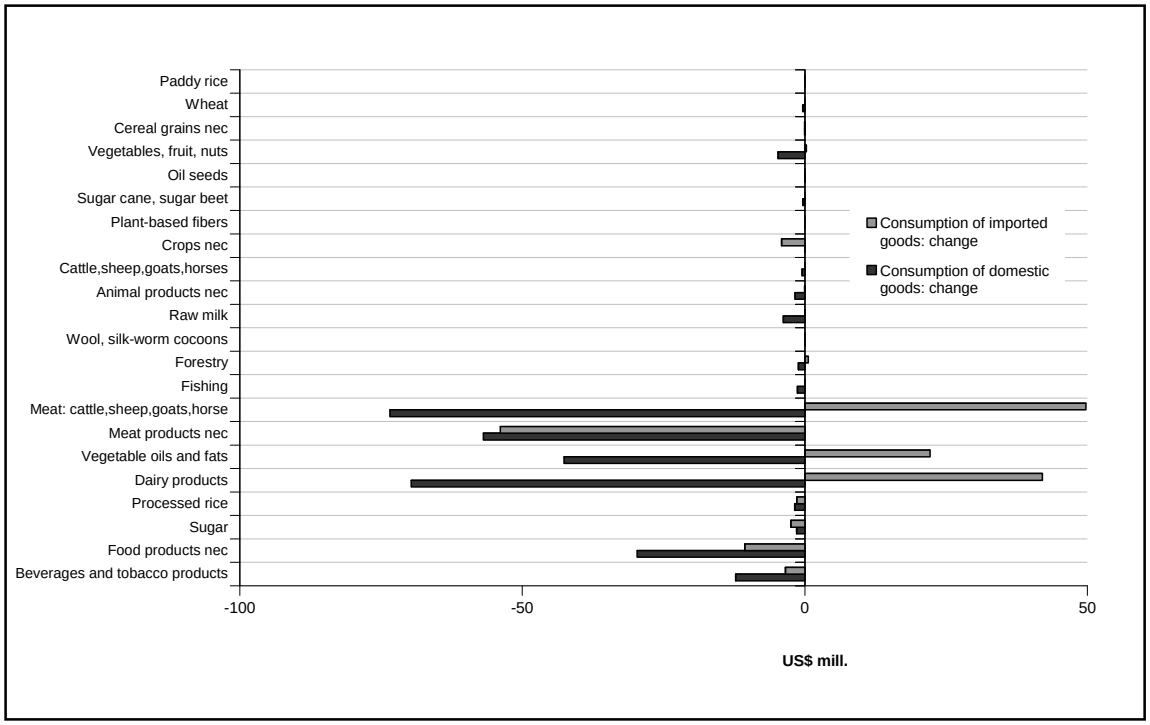


Source: Own calculations.

Figure 5-5 provides some insight into the complexity of these effects. It turns out that within some categories of food products (e.g. beef, sheep and goat meat), Ukraine exports individual products or varieties of lower quality, and simultaneously imports products of higher quality, and that WTO accession will reinforce this pattern. Hence, in Figure 5-5 we see that consumption of imported products in the category 'beef, sheep and goat meat' increase as a result of WTO accession – this is mainly a reflection of increased imports from South America. At the same time, consumption of domestic products from the same category decreases. Some of this reduction in consumption of domestic products corresponds to the reduction in domestic production noted above (see Figure 5-4), but at the same time, exports of these products actually increase (see Figure 5-1) – it can be shown that this is mainly a reflection of increased exports of lower quality products (e.g. offal) to Russia, exports that trigger the negative terms of trade effects discussed earlier. Net exports of products in the category 'beef, sheep and goat meat' fall (see Figure 5-2) because the increased imports of higher quality products from South America to satisfy consumer demand outweigh the increased exports of lower quality products primarily to Russia.

This example (similar mechanisms are at play for the categories 'vegetable oils and fats' and 'dairy products' – see Figure 5-5) highlights the fact that producing quality is not only of importance for the export market, and that the quality challenge faced by Ukrainian agriculture and food processing is not just a question of dealing with high standards in markets such as the EU (regardless of whether these are perceived as being 'fair'). As their incomes continue to grow, Ukrainian consumers themselves will increasingly demand quality. Therefore, Ukrainian agriculture will not only face difficulties on international markets if it fails to deal with quality issues, it will also lose domestic market share.

Figure 5-5: Simulated changes in the composition of consumers' expenditure in Scenario 1a (initial accession commitments) in million US$



Source: Own calculations.

V.3.4. Effects on the cost structure of Ukrainian firms

Table 5-6 illustrates how the use of primary inputs (land, skilled labor, unskilled labor and capital) changes in agriculture and the economy as a whole in Scenarios 1a and 1b. These changes are measured in million US$ and provide an overview of the adjustment processes that take place in Ukraine. Table D7 in Appendix D provides a much more detailed breakdown of these changes for individual agricultural and processed food products, and also contains information on the use of intermediate inputs (i.e. the fact that wheat production also makes use of wheat as seed, etc.).[7]

Table 5-6: Changes in expenditure on primary inputs (million US$)

NVFA	Scenario 1a: primary inputs for agriculture	Scenario 1a: economy wide effects	Scenario 1b: primary inputs for agriculture	Scenario 1b: economy wide effects
Land	-8.987	-8.987	21.703	21.703
Unskilled labor	-5.507	27.816	49.930	144.518
Skilled labor	0.335	0.293	5.547	55.205
Capital	-0.942	40.023	20.854	166.896

Source: Own calculations.

[7] These tables are available for all sectors in the model and can be broken down to distinguish between changes in the use of imported and domestic inputs. All tables are available from the authors on request.

Table 5-6 shows that initial WTO commitments reduce expenditure on land, capital and unskilled labor in agriculture, but slightly increase expenditure on skilled labor. These effects (except for land) are offset by WTO accession effects outside of agriculture where less is spent on skilled workers and expenditure on unskilled labor and capital increases considerably. If a 5% increase in agricultural productivity is added to the WTO accession commitments (Scenario 1b), all sectors increase their expenditure on all inputs. This demonstrates the powerful economy wide multiplier effects that increases in agricultural productivity can have.

V.4. Conclusions and implications

Ukraine's WTO accession will on aggregate have moderate static effects on the Ukrainian economy as a whole. As tariffs are already relatively low for most products, further tariff reductions do not have a major impact on the economy. Most changes occur soon after accession as a result of the immediate accession commitments that Ukraine has made. The remaining commitments up to final implementation, presumably in 2013, have little additional impact.

Positive effects of WTO accession due to increased allocative efficiency are reduced considerably by negative terms of trade effects. In other words, WTO accession makes the Ukrainian economy more efficient as resources are shifted from less to more competitive industries and products. At the same time however, increased Ukrainian production, and the fact that domestic consumers increasingly prefer higher quality imports in some product categories, lead to increased exports. If Ukraine has a large world market share for the products in question (e.g. wheat) increased exports lead to lower prices on world markets, which offsets some of the allocative benefits mentioned above. For some of the products in question (e.g. dairy products, beef, other processed foods), Ukraine does not have a large world market share, but due to quality problems it is only able to export to a small number of other countries (Russia figures prominently). Hence, Ukraine effectively has a large share of the markets in these countries, and when it attempts to export more into these markets, prices fall there as well. This also offsets allocative gains, in some cases strongly.

If Ukraine succeeds in improving the quality of its agricultural products, as well as its quality testing and certification procedures, then it will be able to diversify its agricultural export structure and avoid these negative terms of trade effects. It will also be able to capture a large part of the increasingly discerning domestic food market in Ukraine. To the extent that policy in Ukraine successfully addresses this challenge, the net benefits of WTO accession could be much larger than indicated by the simulations presented in this chapter.

As demonstrated by Scenarios 1b and 2b, even moderate improvements in the efficiency of production in primary agriculture have the potential to significantly amplify gains from WTO accession and to more than offset terms of trade losses. While the conditions of WTO accession are now a given, agricultural policy makers can implement many steps to encourage improvements in productivity. In the long run, such steps, if taken, will have a much larger impact than Ukraine's WTO accession commitments themselves.

VI. Outlook

Ukraine joined the WTO on May 16, 2008, and has initiated negotiations on an FTA with the EU. The chapters in this paper provide background information on the experience that other countries have gathered from their own FTAs with the EU, and first empirical assessments of the impact that trade liberalization can be expected to have on Ukrainian agriculture. A state-of-the-art modeling platform (GTAP) is introduced and used to simulate two very stylized Ukraine-EU FTA scenarios. This platform is then updated to incorporate Ukraine's very recent WTO accession commitments.

The work presented here establishes a framework for future work that could accompany Ukraine's negotiators as they discuss FTA options with the EU, providing them with detailed assessments of the impact of specific FTA scenarios and options.

Quantitative trade simulation models primarily capture the impact of 'traditional' trade policy instruments, in particular tariffs. The analysis above has shown that non-tariff trade restrictions, and in particular the strict quality standards and certification requirements that the EU applies to agricultural and food products, will play a key role in determining what benefits Ukraine can derive from an FTA with the EU. The EU's food quality standards are not negotiable; what will drive outcomes is the extent to which Ukraine succeeds in adjusting its production, processing and certification systems to meet these standards so that Ukrainian producers are able to take advantage of the opportunities (e.g. tariff rate quotas) that the EU agrees to.

This highlights the importance of accompanying the trade policy modeling documented in this paper with more detailed and disaggregated work on domestic agricultural policies in Ukraine. Such complementary work can help to identify the domestic policy measures that Ukraine can take to ensure that agriculture derives the greatest possible benefit from the opportunities presented by WTO membership, FTA with the EU, and any other liberalization of trade with neighbors.

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VIII. Appendix A: Partial Equilibrium Welfare Analysis

The figure below reproduces Figure 3-1 in the paper above. The elimination of the export tax leads to the following changes in important economic quantities:

1) The domestic price increases from P_D to P_W.
2) Domestic production increases from *0i* to *0j*.
3) Domestic consumption falls from *0h* to *0g*.
4) The quantity exported falls increases from *hi* to *gj*.
5) Revenue from the sale of the product in question is P_D*di0* with the export tax (made up of P_D*eh0* sales on the domestic market, and *edih* export revenues).
6) Revenue from the sale of the product in question is P_W*bj0* without the export tax (made up of P_W*ag0* sales on the domestic market, and *abjg* export revenues).
7) Government revenue from the export tax is *klde*; without the tax there is no revenue.
8) Removing the export tax leads to a welfare loss for consumers of $P_W aeP_D$, and a welfare gain for producers of $P_W bdP_D$.
9) Summing the consumers' welfare loss, the government's loss of tax revenue and the producers' welfare gain leads to a net welfare gain for the country equal to the sum of the two triangles *ake* and *lbd*. The former is realized because without the tax, consumers are nor longer able to consume an amount (*gh*) that is worth *aehg* to them but for which they only paid *fehg* with the tax. The latter is realized because without the tax producers produce an amount (*ij*) that is worth *lbji* but only costs *dbji* to produce.

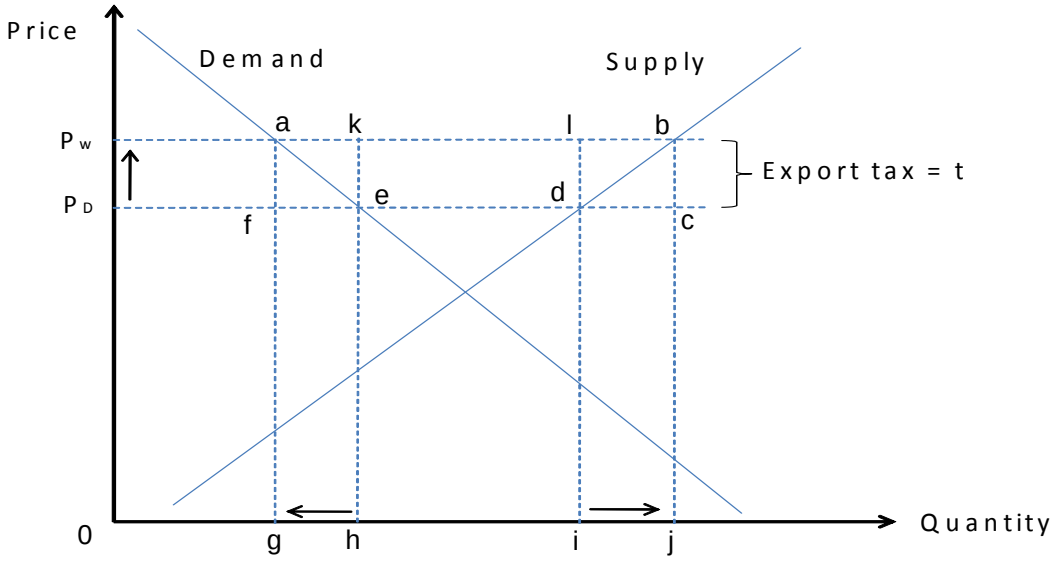


Figure A1: The impact of a trade policy change in a single market model

IX. Appendix B: Basic Data on the Ukrainian Agri-Food Sector and Agricultural Trade

Table B1: Major economic indicators and production of major agricultural products in Ukraine, 1990-2007

	1990-92♠	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007♠♠
Major economic indicators																
Population (million)	52.1	52.1	51.7	51.3	50.8	50.4	49.9	49.4	48.9	48.5	48.0	47.6	47.3	46.9	46.6	46.4
Rural population (mill.)	16.8	16.7	16.6	16.5	16.4	16.3	16.2	16.1	16.0	15.9	15.7	15.5	15.3	15.1	14.9	14.7
Nominal GDP (bnUS$)	77.6	65.6	52.2	48.2	44.6	50.2	41.9	31.6	31.2	37.8	42.6	49.5	65.1	83.1	106.5	140.5
GDP/capita (nom. US$)	1491	1259	1010	940	878	996	840	640	638	779	888	1040	1376	1772	2285	3028
Real GDP growth (%)	-8.2	-14.2	-22.9	-12.2	-10.0	-3.0	-1.9	-0.4	6.0	9.2	5.2	9.6	12.1	2.7	7.1	7.3
Inflation***	na	4735	891.2	376.7	80.3	15.9	10.6	22.7	28.2	12	0.8	5.2	9	13.5	9.1	16.6
GDP shares (%):																
Agriculture	22.7	21.5	16.2	14.5	11.8	11.8	11.9	11.7	14.4	14.4	13	10.9	10.8	9.2	8.6	6.7
Industry	na	na	na	30.9	29.4	24.7	25.2	26.5	26.6	26.1	27.4	27.2	28.3	29.6	29.3	27.9
Construction	na	na	na	7.3	5.5	5.4	4.8	4.1	3.6	3.6	3.4	3.9	4.3	3.9	5	4.5
Trade & transport	na	na	na	14.5	19.6	20.4	20.6	19.7	21.3	23	23.1	25	24.7	26.8	27.7	22.5
Other services	na	na	na	25.5	26.8	25.8	23.3	21.2	19.9	21.2	23.6	24.6	22.6	28.9	29.2	29.4
Crop production (million tons)																
Grains and pulses	42.7	45.6	35.5	33.9	24.6	35.5	26.5	24.6	24.4	39.7	38.8	20.2	41.8	38.0	34.3	29.3
of which:																
Wheat	23.7	21.8	13.9	16.3	13.5	18.4	14.9	13.6	10.2	21.3	20.6	3.6	17.5	17.9	14.0	13.9
Corn	4.1	3.8	1.5	3.4	1.8	5.3	2.3	1.7	3.8	3.6	4.2	6.9	8.9	6.6	6.4	7.4
Rye	1.2	1.2	0.9	1.2	1.1	1.3	1.1	0.9	1.0	1.8	1.5	0.6	1.6	1.3	0.6	0.6
Oats	1.1	1.5	1.4	1.1	0.7	1.1	0.8	0.8	0.9	1.1	0.9	0.9	1.0	0.8	0.7	0.6
Barley	9.1	13.6	14.5	9.6	5.7	7.4	5.9	6.4	6.9	10.2	10.4	6.8	11.1	8.8	11.4	6.0
Sugarbeet	36.4	33.7	28.1	29.7	23.0	17.7	15.5	14.1	13.2	15.6	14.5	13.4	16.6	15.6	22.4	17.0
Sunflower	2.3	2.1	1.6	2.9	2.1	2.3	2.3	2.8	3.5	2.3	3.3	4.3	3.1	4.3	5.3	4.2
Potatoes	17.5	21.0	16.1	14.7	18.4	16.7	15.3	12.7	20.2	17.3	16.6	18.5	20.8	19.5	19.5	19.1
Vegetables	6.0	6.1	5.1	5.9	5.0	5.2	5.5	5.3	5.7	5.9	5.8	6.5	7.0	7.3	8.1	6.8
Fruits and Berries	2.2	2.8	1.2	1.9	1.9	2.8	1.1	0.8	1.5	1.1	1.2	1.7	1.6	1.7	1.1	1.4
Animal production (million tons, except eggs)																
Meat	3.9	2.8	2.7	2.3	2.1	1.9	1.7	1.7	1.7	1.5	1.6	1.7	1.6	1.7	1.7	1.9
of which:																
Beef and veal	1.4	1.1	1.1	0.9	0.8	0.8	0.6	0.6	0.6	0.6	0.7	0.7	0.6	0.5	0.5	0.4
Pork	1.1	0.8	0.7	0.7	0.7	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5
Poultry	0.6	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.5	0.5
Milk	22.0	18.4	18.1	17.3	15.8	13.8	13.8	13.4	12.7	13.4	14.1	13.7	13.8	13.8	13.4	12.2
Eggs (billion)	15.0	11.8	10.2	9.4	8.8	8.2	8.3	8.7	8.7	9.7	11.3	11.5	12.0	13.0	14.2	14.0

*Notes: * Five year averages; ** In thousand constant 1995 PPP US$; *** % change in CPI, average over period.* ♠ - average; ♠♠ - preliminary
Source: State Statistics Committee of Ukraine; IMF (various issues).

Table B2: Economic indicators of agriculture and the food processing industry in Ukraine

		2000	2001	2002	2003	2004	2005	2006	2007
Agriculture									
Gross agricultural output	UAH m	58,475	69,690	70,049	71,151	92,543	94801	98410	113246
	% total output	13.5	13.3	12.2	10.3	10.1	9.6	7.6	7.0
Value added	% GDP	14.4	14.4	13	10.9	10.8	9.2	7.5	6.7
Value added / output	%	42.7	43.3	42	41.4	40.4	40.1	41.7	41.9
Structure of value added:									
Compensation to employees	% sector value added	18.2	19.8	17.4	16.8	16.2	16.9	20.6	19.8
Profit, mixed income	% sector value added	75.4	80.1	81.9	83.6	85.6	85.1	83.6	84.7
Net taxes on production & imports	% sector value added	Na	0.1	0.8	-0.5	-1.9	-2.1	-4.2	-4.4
Employment	thousand people	2,549	2,206	1,877	1,537	1,174	1,038	1,005	680
	% total employed	18.6	17.1	15.3	0.2036	10.4	9.1	8.7	6
Average wage	UAH	114	154	183	219	295	415	518	733
Exports	UAH m	4,963	5,758	7,361	4,052	8,262	9,441	10493	Na
	% total exports	4.7	5.1	5.9	2.6	3.9	4.1	4.2	Na
	% sector output	8.5	8.3	10.5	5.7	8.9	8.9	10.7	Na
Imports	UAH m	921	862	801	5,024	3,338	3,804	4410	Na
	% total imports	0.9	0.8	0.7	3.4	1.8	1.7	1.6	Na
	% sector output	1.6	1.2	1.1	7.1	3.6	3.6	4.5	Na
Exports/imports	Index	5.4	6.7	9.2	0.8	2.5	2.5	2.4	Na
Food processing industry									
Gross output	UAH m	48,892	64,810	68,973	84,470	103,221	116,639	139850	179371
	% total output	11.3	12.4	12	12.3	11.3	10.5	10.8	11.1
Value added	% GDP	7.8	7.7	7.9	8.2	4.2	7.8	Na	Na
Value added / output	%	27.3	24.2	25.8	25.8	24.1	26	Na	Na
Structure of value added:									
Compensation to employees	% sector value added	30.9	26.3	24.7	25.5	34.1	39.5	Na	Na
Profit, mixed income	% sector value added	15	24.8	27.6	28.6	15.6	17.7	Na	Na
Net taxes on production & imports	% sector value added	54.1	48.9	47.6	45.9	50.4	42.8	Na	Na
Employment	thousand people	518	485	464	445	452	465	453	441
	% total employed	3.8	3.8	3.8	3.8	3.9	4	4	4
Average wage	UAH	281	364	423	496	597	779	986	1223
Exports	UAH m	7,775	7,780	8,961	12,246	16,725	16,135	Na	Na
	% total exports	7.3	6.9	7.2	7.9	7.9	7.1	Na	Na
	% sector output	15.9	12	13	14.5	16.2	12.1	Na	Na
Imports	UAH m	3,456	5,005	4,903	6,701	6,648	9,700	Na	Na
	% total imports	3.5	4.6	4.3	4.5	3.6	4.3	Na	Na
	% sector output	7.1	7.7	7.1	7.9	6.4	7.3	Na	Na
Exports/imports	Index	2.2	1.6	1.8	1.8	3.9	1.7	Na	Na

Source: State Statistics Committee of Ukraine; own calculations..

Table B3: Ukrainian net exports of major agricultural commodities, 1995-2007 (thousand tons) and change 1995/97-2005/07 (%)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Change 1995-97 to 2005-07 (%)
Wheat	25.8	963.6	809.0	2766.3	4524.4	-472.2	2670.2	8299.4	-2175.1	1960.7	6000.9	3,286	1,150	480
Rye	-28.6	185.4	21.5	0.8	271.8	3.1	13.3	467.7	-169.6	49.9	80.5	-5	10	-52
Barley	451.5	1104.4	460.7	581.7	1065.1	841.8	2184.4	2818.1	1862.0	3686.7	3504.5	5,083	980	374
Oats	6.9	86.7	1.4	0.0	55.0	24.1	42.9	29.4	-0.2	22.6	4.3	n.a.	n.a.	-72*
Maize	-2.5	141.4	56.9	581.5	282.6	71.2	364.9	492.1	921.6	1219.9	2787.4	1,003	1,500	2602
Sunflower seed	19.2	853.1	1072.1	906.6	432.7	833.0	582.5	67.3	866.3	349.5	32.5	316	160	-74
Sunflower oil	83.7	267.2	181.1	178.3	166.5	582.4	473.2	566.1	922.9	867.9	851.0	1,875	1,168	632
Sugar	987.5	813.1	693.7	-31.4	-252.2	-305.2	-442.4	-266.5	-1064.3	-244.3	-178.3	-43	-10	-109
Beef & veal	4.1	3.8	1.3	1.0	0.3	0.0	0.0	0.6	0.2	0.2	0.0	-6	27	128
Pork	-0.3	7.2	5.6	-2.4	2.5	9.1	-1.7	-0.2	2.7	-41.4	-45.8	-59	-79	-1570
Milk & dairy:	1362	790	103	264	310	1050	1800	866	1071	2046	n.a.	n.a.	n.a.	107*
skimmed milk	n.a	n.a	n.a	n.a	n.a	56.5	95.7	59.8	72.0	107.7	97.2	92.3	n.a	n.a
cheese	n.a	n.a	n.a	n.a	n.a	11.3	29.0	35.2	59.2	90.6	110.6	40.7	n.a	n.a

*Source: State Statistics Committee of Ukraine and own calculations. * - Change 1995-97 to 2003-05 (%).*

Table B4: Ukrainian trade of major agricultural commodities with the EU-25, 1995-2006 (thousand tons) and change 1995/97-2005/07 (%)

	2000		2001		2002		2003		2004		2005		2006		Change 2000-01 to 2005-06 (%)	
	Export	**Import**	**Export**	**Import**	**Export**	**Import**	**Export**	**Import**	**Export**	**Import**	**Export**	**Import**	**Export**	**Import**	**Export**	**Import**
Wheat	58.3	177.7	1374.7	10.5	4575.0	0.3	468.7	226.8	898.0	21.5	2162.8	0.3	1109.8	0.4	128	-100
Barley	213.8	22.8	359.3	27.7	515.1	18.1	123.0	25.4	264.3	22.7	144.6	0.4	2213.5	1.6	311	-96
Oats	0.7	0.0	4.5	0.0	2.5	0.0	1.3	0.0	11.2	0.0	na	na	na	na	na	na
Maize	8.1	83.6	52.1	1.9	78.7	3.9	311.5	20.6	180.6	10.2	466.4	6.6	337.0	9.8	1236	-81
Sunflower seed	560.1	0.5	494.9	0.3	39.9	0.6	450.3	0.8	179.1	3.6	33.3	0.8	218.5	0.9	-76	100
Sunflower oil	143.7	0.1	104.4	0.1	213.9	0.1	272.9	0.1	348.7	0.1	371.5	0.1	829.8	0.1	384	-53
Beef & veal	0.1	0.9	0.0	1.0	0.0	0.3	0.0	0.3	0.0	0.5	0.0	0.6	0.0	0.4	-100	-49
Pork	0.0	1.0	0.0	1.7	0.0	1.2	0.0	9.1	0.0	19.1	0.0	7.3	0.0	2.7	0!	274
Milk & dairy:																
skimmed milk	31.8	0.5	41.4	0.5	13.8	0.7	8.2	1.0	5.1	0.4	1.5	0.5	2.7	0.9	-94	37
butter milk, yoghurt	0.0	2.7	0.1	2.8	0.0	0.4	0.0	0.8	0.0	1.3	0.0	0.6	0.0	0.1	-100	-87
butter	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.0	1.3	0.0	1.3	0.0	1.3	0	1320
cheese	1.9	1.1	1.6	1.0	1.8	0.6	1.3	0.6	0.1	0.4	0.0	1.5	0.0	1.9	-100	60

Source: Ministry of Agrarian Policy; own calculations.

X. Appendix C: Updating GTAP7 Pre-Release Tariff Data

Table C1: Countries/regions available in GTAP-7

1	Australia	31	Colombia	61	Slovakia	91	*Rest of Western Africa*
2	New Zealand	32	Ecuador	62	Slovenia	92	Central Africa
3	*Rest of Oceania*	33	Paraguay	63	Spain	93	South Central Africa
4	China	34	Peru	64	Sweden	94	Madagascar
5	Hong Kong	35	Uruguay	65	United Kingdom	95	Malawi
6	Japan	36	Venezuela	66	Switzerland	96	Mauritius
7	Korea	37	*Rest of South America*	67	*Rest of EFTA*	97	Mozambique
8	Taiwan	38	Nicaragua	68	Albania	98	Tanzania
9	*Rest of East Asia*	39	*Rest of Central America*	69	Bulgaria	99	Uganda
10	Cambodia	40	Caribbean	70	Croatia	100	Zambia
11	Indonesia	41	Austria	71	Romania	101	Zimbabwe
12	Malaysia	42	Belgium	72	Russian Federation	102	*Rest of Eastern Africa*
13	Philippines	43	Cyprus	73	Ukraine	103	Botswana
14	Singapore	44	Czech Republic	74	*Rest of Eastern Europe*	104	South Africa
15	Thailand	45	Denmark	75	*Rest of Europe*	105	*Rest of South African Customs*
16	Viet Nam	46	Estonia	76	Kazakhstan		
17	*Rest of Southeast Asia*	47	Finland	77	Kyrgyzstan		
18	Bangladesh	48	France	78	*Rest of Former Soviet Union*		
19	India	49	Germany	79	Armenia		
20	Pakistan	50	Greece	80	Azerbaijan		
21	Sri Lanka	51	Hungary	81	Georgia		
22	*Rest of South Asia*	52	Ireland	82	Iran Islamic Republic of		
23	Canada	53	Italy	83	Turkey		
24	United States of America	54	Latvia	84	*Rest of Western Asia*		
25	Mexico	55	Lithuania	85	Egypt		
26	*Rest of North America*	56	Luxembourg	86	Morocco		
27	Argentina	57	Malta	87	Tunisia		
28	Bolivia	58	Netherlands	88	*Rest of North Africa*		
29	Brazil	59	Poland	89	Nigeria		
30	Chile	60	Portugal	90	Senegal		

Source: Global Trade Analysis Project, www.gtap.org.

Table C2: Sectors available in GTAP-7

1	Paddy rice	21	Vegetable oils and fats	41	Machinery and equipment nec
2	Wheat	22	Dairy products	42	Manufactures nec
3	Cereal grains nec	23	Processed rice	43	Electricity
4	Vegetables, fruit, nuts	24	Sugar	44	Gas manufacture, distribution
5	Oilseeds	25	Food products nec	45	Water
6	Sugar cane, sugar beet	26	Beverages and tobacco products	46	Construction
7	Plant-based fibers	27	Textiles	47	Trade
8	Crops nec	28	Wearing apparel	48	Transport nec
9	Cattle, sheep, goats, horses	29	Leather products	49	Sea transport
10	Animal products nec	30	Wood products	50	Air transport
11	Raw milk	31	Paper products, publishing	51	Communication
12	Wool, silk-worm cocoons	32	Petroleum, coal products	52	Financial services nec
13	Forestry	33	Chemical, rubber, plastic prods	53	Insurance
14	Fishing	34	Mineral products nec	54	Business services nec
15	Coal	35	Ferrous metals	55	Recreation and other services
16	Oil	36	Metals nec	56	Public administration, defense, health, education
17	Gas	37	Metal products	57	Dwellings
18	Minerals nec	38	Motor vehicles and parts		
19	Meat: cattle, sheep, goats, horses	39	Transport equipment nec		
20	Meat products nec	40	Electronic equipment		

Source: Global Trade Analysis Project, www.gtap.org.

Updating GTAP tariffs

GTAP-7 includes applied tariffs at the HS6 level in HS96 nomenclature. Ukraine's WTO accession commitments were therefore adjusted to the GTAP level as follows:

HS 02 nomenclature was adjusted to HS96.

Specific tariffs: Specific tariffs matter mostly for a few beverages and are not a key element of Ukrainian agri-food policy. For simplicity, specific tariffs were replaced by the highest *ad valorem* tariff in the corresponding HS6 group.

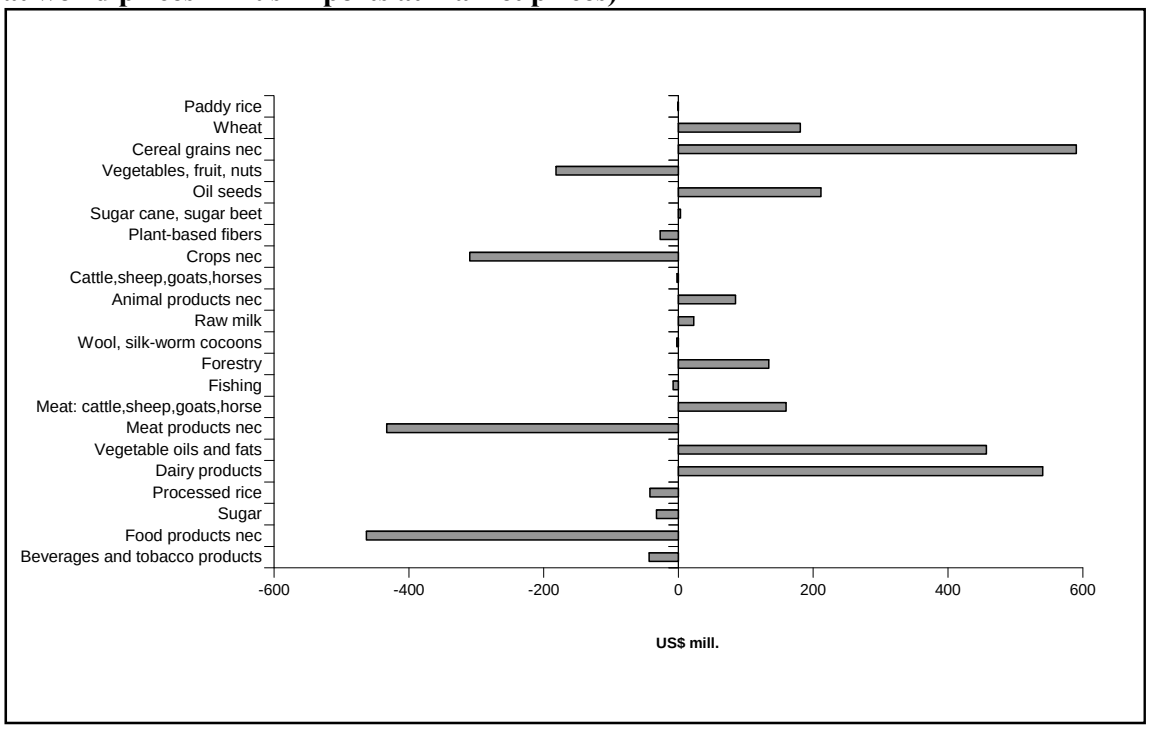
Ukrainian WTO commitments are documented as HS 08 or HS10 tariff lines. To convert from HS10 to HS6 level tariff aggregates, unweighted arithmetic averages of negotiated tariff bindings were calculated for each HS06 group. This procedure is common for the aggregation of MacMap applied tariffs.

The resulting table was added to the HS6 level MacMap data. The MacMap data are aggregated according to the GTAP concordances to reflect the sectoral aggregations of the GTAP database. Note that aggregated tariffs at the GTAP database level may deviate significantly from averages or trade weighted averages at the HS6 level. This is due to the fact that the GTAP aggregation follows an aggregation scheme based on national accounts (Social Account Matrices) that distinguish sectors according to their degree of processing (e.g. primary agriculture, processed agriculture, processed foods, etc.), while the HS6 data tend to aggregate products along their degree of processing (wheat, flour, etc.). Concordances for the aggregation of HS products into GTAP sectors can be obtained from the GTAP website.

Into this projected base data set, applied MacMaps tariffs were implemented according to the FAL (Braunschweig, Germany) aggregation procedure. This procedure initially does not discard applied tariffs with corresponding above zero trade volumes. However, in some instances the resulting applied tariffs were significantly higher than the values in the GTAP-7 dataset. Since the GTAP-7 data are still under construction and Ukraine is explicitly disaggregated in this version for the first time, it was decided to reproduce these initial tariff aggregates as a benchmark. Therefore, the FAL aggregation procedure was used with the following modification: Applied *ad valorem* tariffs greater than or equal to 100% are considered if corresponding trade volumes exceed US$ 500. *Ad valorem* tariffs less than 100% are only considered if trade volumes are at least equal to US$1000. This modification reproduces about 85% of all applied tariffs in the GTAP-7 database.

XI. Appendix D: Detailed Tariff Reductions and Simulation Results

Figure D1: Ukraine's net trade assumed in the baseline for 2009 in million US$ (exports at world prices minus imports at market prices)



Source: Own calculations.

Table D1: Percent reductions in Ukraine's applied tariffs by trading partner due to WTO commitments – Scenario 1a

Trading partner / Product	*Oceania*	*East Asia*	*South East Asia*	*South Asia*	*North America*	*Latin America*	*EU 25*	*Middle East and North Africa*	*Sub Sahara Africa*	*Russia*
Paddy rice										
Wheat					0,037	0,035	0,011	-0,035		-0,042
Cereal grains nec		0,011			-0,031	-0,041	-0,009			0,010
Vegetables, fruit, nuts	-6,680	-21,671	-15,222	-16,948	-37,098	-16,634	-23,079	-19,662	-19,433	-49,177
Oil seeds	0,012	0,046	-0,012	0,020	0,017	-0,015	0,013	-0,030		0,011
Sugar cane, sugar beet			-21,538				-21,538			
Plant-based fibers							0,003			0,032
Crops nec	-0,796	-0,019	-0,421	-0,896	-0,077	-16,853	-8,343	-15,444	-0,693	-3,366
Cattle, sheep, goats, horses					0,004		-0,354			0,006
Animal products nec	-0,007	-4,928	-1,155	0,010	-2,223	-1,397	-1,431	-4,554	-31,895	-1,442
Raw milk										
Wool, silk-worm cocoons							0,015			
Forestry		-63,649	-0,013	-0,016	-50,888	-63,960	-33,968	-82,337	0,029	0,004
Fishing	-31,379	0,032	-37,134	-11,176	-14,217		-6,052	-0,021	-0,009	
Coal										
Oil							0,043			
Gas										
Minerals nec	-0,024	0,038		-0,042	0,010	-0,023	-0,016	-0,041	0,010	0,001
Meat: cattle, sheep, goats, horse	-20,863	-4,619	0,018	-38,442	-4,832	-33,678	-36,300		-16,043	-32,040
Meat products nec	0,024	-37,470			-25,292	-41,004	-26,691		0,045	-0,763
Vegetable oils and fats		-27,888	-6,156	0,022	-13,764	0,025	-11,958	-0,024	-0,007	-24,655
Dairy products	-27,181	-16,043	-33,024		-19,132		-18,228	-18,706		-27,205
Processed rice										
Sugar					0,026		-0,021			-0,025
Food products nec	-7,789	-4,703	-7,043	-3,323	-2,269	-2,337	-1,394	-5,586	-8,744	-0,525
Beverages and tobacco products	-0,003	-0,035	-0,017	-0,022	-0,001	0,006	0,026	-0,030	-0,020	-0,016
Textiles	0,037	-0,052	0,043	-0,041	-0,020	0,034	-0,065	0,033	0,023	-0,098
Wearing apparel	0,024	0,032	-0,042	0,033	-0,023	0,003	0,036	-0,027	0,032	-0,256
Leather products	-0,029	0,007	0,026	-0,024	0,036	0,015	-0,009	0,025		0,005
Wood products	0,042	-1,376	0,022	0,031	-0,436	0,002	-0,283	0,043	-0,072	-1,248
Paper products, publishing	-0,036	-0,072	-0,050	-6,720	-1,760	0,037	-0,407	-0,127	-0,005	-0,061
Petroleum, coal products	-0,014	0,004	-0,037	0,035	0,040	-0,037	0,041	-0,005		-0,033
Chemical, rubber, plastic prods	0,011	-0,253	-0,591	-0,074	-0,120	-0,362	-0,332	-1,852	0,042	-0,281
Mineral products nec	-0,025	-0,146	-0,022	-0,081	-1,181	-0,778	-0,679		-0,041	-2,223
Ferrous metals	-0,004	0,003		-0,029	-0,205	-0,016	-0,109	0,014	-0,016	-0,044
Metals nec	-0,016	-0,014	-0,024	0,004	-0,648	-0,318	-0,018	0,029	-0,007	-0,088
Metal products	-0,019	-0,511	-0,112	-0,609	-0,137	-0,143	-0,543	-0,597	-0,028	-0,468
Motor vehicles and parts	-0,296	-0,429	-2,513	-0,866	-1,383	-0,065	-0,666	-0,177	-0,384	-1,202
Transport equipment nec	-0,029	-0,119	0,026	0,029	-0,498	0,035	-0,478	-8,581	-0,020	-0,017
Electronic equipment	-0,013	-2,841	-0,905	-2,941	-0,831	-0,480	-1,107	-0,172	-5,802	-1,697
Machinery and equipment nec	-0,766	-0,705	-0,630	-0,134	-0,788	-0,442	-0,653	-1,207	-2,316	-0,855
Manufactures nec	0,031	0,022	-0,003	-0,015	-0,075	-0,537	-0,130	-0,007	-0,005	-1,509

Table D2: Percent reductions in Ukraine's applied tariffs by trading partner due to WTO commitments – Scenario 1a (continued)

Trading partner / Product	*Rest of Eastern Europe*	*Rest of Former Soviet Union*	*Armenia*	*Azerbaijan*	*Georgia*	*Iran*	*Turkey*	*Kyrgyztan*
Paddy rice								
Wheat	-0,013	-0,013						
Cereal grains nec	0,023					-0,013		
Vegetables, fruit, nuts	-44,675	-22,247	-12,696	-31,711	-26,086	-6,536	-15,812	-35,825
Oil seeds	0,005	0,038				-0,018	0,017	
Sugar cane, sugar beet								
Plant-based fibers							0,003	
Crops nec	-0,153	-5,540		-30,751	-1,134	-0,004	-14,422	-1,164
Cattle, sheep, goats, horses	-10,190							
Animal products nec	-0,070	-30,598		-2,507		-2,507		-4,650
Raw milk								
Wool, silk-worm cocoons								
Forestry	-0,020	0,023			0,015	-0,023	0,037	-0,026
Fishing			-2,789		-4,696		-10,060	
Coal								
Oil								
Gas								
Minerals nec	-0,027	0,046	0,035	-0,036	0,012	0,011	0,026	
Meat: cattle, sheep, goats, horse					-36,914			
Meat products nec					-38,788		-23,267	0,028
Vegetable oils and fats	-0,531	-0,033					-16,805	0,021
Dairy products	-1,941		-22,773				0,007	0,007
Processed rice								
Sugar	-0,003		0,019					
Food products nec	-0,287	-0,653	0,005	-5,912	-0,325	-6,111	-4,198	0,032
Beverages and tobacco products	-0,015		0,019	-0,021	-0,016		0,027	-0,021
Textiles	0,021	-0,013	-0,003	-0,042	0,025	-0,008	-0,055	-0,037
Wearing apparel	-0,015	-0,555				-0,025	-0,025	-0,038
Leather products	-0,002	-0,028				0,038	-0,011	
Wood products	-0,153				0,034	-0,002	-0,170	-0,004
Paper products, publishing	-1,279		0,008		0,001	-0,005	-0,295	
Petroleum, coal products	-0,012	-0,036		-0,017		0,031	-0,018	-0,017
Chemical, rubber, plastic prods	-0,179	-0,008	-0,040	-1,032	-0,020	0,014	-0,489	-0,178
Mineral products nec	-0,151	0,037	0,014	-0,030		-1,618	-0,176	
Ferrous metals	0,029	0,031		-0,041	0,006	-0,020	-0,103	
Metals nec	0,023			-0,004	-4,762	-0,048	0,044	0,021
Metal products	-1,896		0,028	-0,037	-0,014	-0,056	-0,437	0,031
Motor vehicles and parts	-0,880	-0,224	-0,984	0,011	0,031	-0,083	-0,253	-4,607
Transport equipment nec	-0,019	-0,030	0,047	-0,026	0,041	-0,029	-0,568	-0,028
Electronic equipment	-4,566	0,038	-16,230		-0,025	-2,675	-6,999	-0,032
Machinery and equipment nec	-4,307	-0,931	-0,955	-0,616	-0,135	-0,335	-0,728	-0,187
Manufactures nec	-0,522		0,004			0,026	-0,699	0,011

Table D3: Percent reductions in Ukraine's applied tariffs by trading partner due to WTO commitments – Scenario 1a (continued)

Trading partner / Product	*Kazakhstan*	*Switzerland*	*Rest of EFTA*	*Albania*	*Bulgaria*	*Croatia*	*Romania*	*Rest of Europe*
Paddy rice								
Wheat	-0,024	0,041			-0,033			0,017
Cereal grains nec	0,023				-0,035			-0,043
Vegetables, fruit, nuts	-46,814	0,010			0,023		-5,419	-6,026
Oil seeds					0,018		0,011	0,009
Sugar cane, sugar beet								
Plant-based fibers								
Crops nec	-0,028	-0,031	-0,021	-0,028	-0,629	0,005	-0,029	-2,075
Cattle, sheep, goats, horses								
Animal products nec	-1,351	0,038			-1,361			-2,415
Raw milk								
Wool, silk-worm cocoons								
Forestry		0,011			0,047			
Fishing			-20,249		0,001			
Coal								
Oil								
Gas								
Minerals nec	0,001	-0,030	0,008		-0,044			0,026
Meat: cattle, sheep, goats, horse		0,018			0,014		-0,031	
Meat products nec			0,020		-12,266		-2,532	
Vegetable oils and fats	0,021	-0,008			-27,898		0,046	0,018
Dairy products		-15,820			-0,021		0,007	
Processed rice								
Sugar								
Food products nec	-0,404	-0,045	-4,163		-0,149	0,009	-0,155	-7,246
Beverages and tobacco products	0,007	-0,005	-0,013	-0,013	0,012	-0,013	0,025	0,004
Textiles	-0,048	-0,023	-0,150	0,017	0,040	0,041	-0,001	0,037
Wearing apparel		0,007			0,005	-0,029	0,028	-0,003
Leather products	0,004	0,032			0,013	-0,027	-0,020	-0,037
Wood products	-0,019	-0,002	0,038		-0,667	-0,027	-0,008	-0,004
Paper products, publishing	0,025	-0,225	0,029		-0,033	-0,007	0,015	0,027
Petroleum, coal products	-0,033	-0,042	0,014		-0,019	-0,035	0,015	-0,030
Chemical, rubber, plastic prods	-0,007	-0,482	-0,639		-0,055	-0,175	-0,371	-0,084
Mineral products nec	-0,009	-6,676	-0,045		0,036	-0,030	-0,017	-4,423
Ferrous metals	0,012	0,036	-0,024		0,044	0,020	0,014	
Metals nec	-0,073	-0,214	0,013		-0,035		0,028	0,038
Metal products	-0,694	-0,220	-1,685		-0,170	0,038	-0,165	-0,046
Motor vehicles and parts	-0,038	-0,815	-0,833		-0,949	-0,006	-1,748	-1,685
Transport equipment nec	0,032	0,042	-5,244		-0,208	-0,831	0,036	-0,044
Electronic equipment	0,005	-2,250	-2,491	-0,016	-4,822	-0,049	-1,145	0,010
Machinery and equipment nec	-0,137	-0,448	-0,354		-5,879	-0,711	-0,853	-0,191
Manufactures nec	-0,042	0,010	-0,021		-0,032	-0,032	0,040	-0,025

Table D4: Change in Ukrainian exports by destination in million US$ – Scenario 1a

Destination / Product	*Oceania*	*East Asia*	*South East Asia*	*South Asia*	*North America*	*Latin America*	*EU 25*	*Middle East and North Africa*
Paddy rice		0,01						
Wheat	0,14	13,17	46,34	7,34	6,93	0,31	117,08	60,71
Cereal grains nec	0,03	0,18	0,04	0,01	1,11	0,04	75,69	341,42
Vegetables, fruit, nuts	0,53	3,58	0,88	10,25	4,51	0,65	62,95	6,58
Oil seeds	0,01	0,21	0,06	13,76	3,44	2,42	146,95	11,74
Sugar cane, sugar beet	0,07	0,51	0,11	0,03	0,59	0,08	1,59	0,09
Plant-based fibers		0,02		0,60	0,00		2,76	
Crops nec	0,00	0,82	0,02	0,11	0,22	0,04	11,22	3,84
Cattle, sheep, goats, horses	0,05	0,35	0,07	0,02	0,44	0,06	1,95	2,77
Animal products nec	0,16	2,00	0,18	0,64	5,31	0,19	64,13	1,60
Raw milk	0,54	3,73	0,77	0,23	4,33	0,60	11,68	0,68
Wool, silk-worm cocoons		0,00			0,00		0,21	
Forestry	0,01	0,31	0,27	0,08	0,66	0,02	77,81	2,32
Fishing	0,02	0,15	0,03	0,01	0,25	0,03	0,67	0,04
Coal		0,06	0,01	0,36	0,74	0,39	9,59	3,25
Oil	0,00	0,00	0,00	0,00	0,01	0,00	2,90	0,01
Gas	0,00	0,11	0,08		0,02	0,01	1,72	0,00
Minerals nec	0,08	22,49	5,54	7,14	11,07	2,37	709,13	35,46
Meat: cattle, sheep, goats, horse	0,29	2,04	0,41	0,13	2,28	0,32	6,44	0,47
Meat products nec	0,04	0,24	0,05	0,02	0,31	0,04	0,76	0,04
Vegetable oils and fats	0,18	2,41	0,26	0,10	1,66	42,22	246,24	74,89
Dairy products	0,46	26,86	6,40	9,43	13,01	2,59	127,48	51,37
Processed rice	0,09	0,61	0,13	0,04	0,71	0,10	1,92	0,11
Sugar	0,13	2,22	2,03	0,99	1,01	0,39	7,56	0,16
Food products nec	0,74	14,70	1,01	0,69	14,11	0,88	105,82	71,40
Beverages and tobacco products	0,75	15,33	1,04	0,60	8,28	1,07	42,68	3,20
Textiles	1,19	9,56	2,28	7,45	18,91	3,80	190,86	2,01
Wearing apparel	0,90	5,64	0,72	0,16	74,11	1,37	666,75	2,12
Leather products	0,63	10,83	0,64	8,19	14,22	2,67	265,79	11,47
Wood products	0,27	1,85	3,49	0,35	7,33	0,18	367,21	13,59
Paper products, publishing	0,21	5,84	0,91	7,24	1,90	11,31	34,25	2,13
Petroleum, coal products	0,91	11,96	32,17	3,14	86,77	7,82	347,32	22,45
Chemical, rubber, plastic prods	5,42	196,34	62,04	244,04	246,39	293,50	932,76	244,42
Mineral products nec	0,24	4,09	2,03	1,11	6,85	1,17	197,03	3,29
Ferrous metals	1,16	1398,92	607,41	229,20	320,53	154,57	2465,10	2018,01
Metals nec	0,24	93,13	9,31	11,34	42,68	1,38	229,04	6,97
Metal products	1,37	3,10	3,47	2,80	7,54	1,84	162,07	2,96
Motor vehicles and parts	0,39	10,71	7,62	3,30	4,69	2,32	37,77	72,41
Transport equipment nec	1,37	48,76	4,61	42,13	664,15	10,79	158,78	121,63
Electronic equipment	0,63	7,28	2,53	2,46	6,80	5,20	192,60	3,85
Machinery and equipment nec	6,14	43,57	18,43	63,13	66,17	153,64	702,24	266,17
Manufactures nec	0,64	7,91	1,38	0,35	16,91	0,72	93,97	33,96
Electricity	0,06	8,60	0,05	0,95	8,82	14,31	245,37	1,31
Gas manufacture, distribution	0,03	2,80	1,96	0,01	0,40	0,29	8,47	0,04
Water	0,33	2,28	0,47	0,14	2,64	0,37	7,13	0,42
Construction	0,50	16,49	3,68	1,51	4,79	0,81	44,32	2,15
Trade	11,84	82,33	17,03	4,94	94,24	13,23	254,51	15,82
Transport nec	32,41	150,98	32,85	7,53	424,55	27,10	495,82	25,43
Sea transport	6,87	134,40	38,08	11,01	10,81	33,00	310,88	23,71
Air transport	11,79	68,64	16,24	10,36	90,89	18,27	209,22	13,26
Communication	5,48	28,16	7,47	2,93	42,82	6,07	137,74	6,81
Financial services nec	0,63	5,48	1,34	0,64	6,01	1,11	22,22	1,74
Insurance	0,43	4,73	1,20	0,43	10,97	1,10	11,33	1,63
Business services nec	8,94	85,67	31,62	12,29	112,35	18,96	390,05	33,44
Recreation and other services	3,69	24,01	5,85	1,40	27,82	4,13	78,89	4,56
Public administration, defense, health, education	10,30	63,29	15,20	6,10	337,61	21,53	219,52	87,53
Dwellings								

Table D5: Change in Ukrainian exports by destination in million US$ – Scenario 1a (continued)

Destination / Product	*Rest of Eastern Europe*	*Rest of Former Soviet Union*	*Armenia*	*Azerbaijan*	*Georgia*	*Iran*	*Turkey*	*Kyrgyztan*	*Kazakhstan*
Paddy rice					0,03				
Wheat	1,25	0,00	0,34	0,04	1,40	0,00	4,37	0,00	0,02
Cereal grains nec	34,14		4,55	1,46	0,54	42,86	30,08		0,36
Vegetables, fruit, nuts	4,16	0,35	0,74	0,29	0,68	0,45	4,29	0,00	0,03
Oil seeds	0,99	0,27			15,63		61,25		0,00
Sugar cane, sugar beet	0,00	0,00		0,00	0,00	0,00	0,01		0,01
Plant-based fibers									
Crops nec	1,24	0,01	0,01	0,02	0,04		4,23		0,15
Cattle, sheep, goats, horses	0,01			0,00	0,00	0,00	0,01		0,00
Animal products nec	65,17	0,01	0,11	0,11	0,10	0,00	2,96		0,07
Raw milk	0,03	0,01	0,00	0,01	0,01	0,01	0,11	0,00	0,04
Wool, silk-worm cocoons									
Forestry	1,54		0,03	0,05	0,20		75,00		0,00
Fishing	0,10						0,31		0,00
Coal	5,50	0,20			0,05	0,03	1,00		0,02
Oil							0,02		
Gas		0,00				0,01	0,00		
Minerals nec	17,67	0,66	0,11	1,46	3,21	0,75	28,98	0,01	3,85
Meat: cattle, sheep, goats, horse	0,02	0,00	0,00	0,01	0,02	0,01	0,06	0,00	0,02
Meat products nec	1,02	0,45	0,16	0,23	0,10	0,00	0,01		0,00
Vegetable oils and fats	35,50	2,06	6,01	5,94	17,03	29,30	38,55	0,72	7,08
Dairy products	10,12	5,45	7,82	7,51	4,93	0,01	5,00	0,72	12,86
Processed rice	0,03	0,00		0,00	0,07	0,00	0,02		0,01
Sugar	21,44	1,11	2,22	9,17	4,90	0,00	0,44	0,74	1,45
Food products nec	69,27	10,64	7,22	35,15	17,71	0,02	26,36	8,47	81,34
Beverages and tobacco products	29,06	5,59	14,73	6,51	21,67	6,31	8,84	0,31	2,33
Textiles	7,24	0,45	0,09	0,22	0,34	0,19	21,53	0,17	1,72
Wearing apparel	0,43	0,07	0,05	0,01	0,15	0,01	0,61	0,01	0,06
Leather products	4,11	2,33	0,18	0,01	0,06	0,01	0,96	0,04	0,70
Wood products	13,56	5,62	0,75	5,76	3,51	0,15	40,84	0,88	6,91
Paper products, publishing	24,28	2,06	2,26	4,55	4,01	10,28	3,88	0,99	19,91
Petroleum, coal products	23,06	8,06	0,53	0,01	0,85	0,43	51,81	0,02	6,05
Chemical, rubber, plastic prods	135,54	36,41	6,26	15,52	13,24	32,94	329,85	3,38	32,41
Mineral products nec	34,19	6,85	1,21	6,82	3,05	1,54	3,18	0,17	14,25
Ferrous metals	340,04	90,94	13,64	64,58	18,35	260,28	1140,46	2,48	131,33
Metals nec	8,72	10,79	0,27	0,16	0,97	0,31	20,39	0,00	0,50
Metal products	23,95	17,47	3,20	9,98	2,55	1,13	9,26	0,37	11,84
Motor vehicles and parts	16,80	12,32	1,03	2,33	3,05	0,10	0,30	0,27	14,82
Transport equipment nec	19,61	28,43	0,41	20,41	4,48	60,26	7,55	0,10	204,26
Electronic equipment	1,72	2,10	0,19	0,15	0,11	0,05	2,45	0,15	3,26
Machinery and equipment nec	139,90	166,07	3,95	33,42	20,40	36,50	11,89	3,51	134,36
Manufactures nec	2,39	0,34	0,16	0,02	0,12	0,22	0,83	0,03	1,39
Electricity	89,90	2,13	0,15	0,03	0,01		0,18	0,02	0,14
Gas manufacture, distribution	0,00	0,05		0,00		0,22	0,09		0,00
Water	0,02	0,00	0,00	0,00	0,00	0,01	0,07	0,00	0,02
Construction	0,06	0,06	0,01	2,43	0,02	0,02	0,11	0,01	1,33
Trade	0,61	0,19	0,07	0,13	0,14	0,29	2,32	0,05	0,80
Transport nec	1,85	0,22	0,28	0,28	0,49	0,46	9,20	0,27	1,76
Sea transport	0,39	0,07	0,01	0,32	0,04	0,04	0,13	0,00	0,15
Air transport	0,27	0,18	0,17	0,14	0,15	0,08	0,28	0,04	0,54
Communication	0,37	0,08	0,05	0,08	0,07	0,08	1,11	0,03	0,38
Financial services nec	0,03	0,09	0,01	0,01	0,01	0,05	0,20	0,01	0,06
Insurance	0,02	0,07	0,01	0,01	0,01	0,10	0,20	0,01	0,05
Business services nec	0,43	0,46	0,06	0,92	0,07	0,26	1,11	0,08	3,43
Recreation and other services	0,18	0,06	0,02	0,04	0,04	0,08	0,73	0,02	0,23
Public administration, defense, health, education	0,58	0,16	0,10	0,20	0,28	4,79	5,60	0,05	0,70
Dwellings									

Table D6: Change in Ukrainian exports by destination in million US$ – Scenario 1a (continued)

Destination / Product	Switzerland	Rest of EFTA	Albania	Bulgaria	Croatia	Romania	Rest of Europe
Paddy rice	0						
Wheat	0	0,09	1,67	0,01	0,01	0,01	0,03
Cereal grains nec	0	0,2	1,85	4,98	0,4	36,39	2,3
Vegetables, fruit, nuts	0,01	0,52	0,5	0,93	0,19	0,17	0,42
Oil seeds	0,07	0,09		0,5	0,02	0,72	1,07
Sugar cane, sugar beet	0	0,05	0	0,01	0,01	0	0
Plant-based fibers	0						0
Crops nec	0			0,16	0	1,02	0,86
Cattle, sheep, goats, horses	0	0,04	0	0,01	0	0	0
Animal products nec	0	0,08	0,01	0,08	0,01	0,11	0,04
Raw milk	0,01	0,38	0,03	0,05	0,04	0,02	0,02
Wool, silk-worm cocoons	0						
Forestry	0,01	0,02	0	3,19	0,02	7,39	0,03
Fishing	0	0,02	0	0	0	0	0
Coal	0	0	0,01	19,51	0,45	1,65	0,56
Oil	0					0,01	
Gas	0	0,01		0,03		0,04	
Minerals nec	0	0,05	0,01	14,17	1,49	64,73	31,47
Meat: cattle, sheep, goats, horse	0,02	0,2	0,01	0,03	0,02	0,01	0,01
Meat products nec	0	0,02	0	0	0	0	0
Vegetable oils and fats	3,06	8,22	1,63	0,15	0,05	0,03	2,37
Dairy products	0,03	0,31	0,37	6,6	0,37	2,69	0,44
Processed rice	0,01	0,06	0	0,01	0,01	0	0
Sugar	0,01	0,09	0,01	0,08	0,01	0,9	0,27
Food products nec	0,1	0,68	0,03	0,17	0,83	0,72	0,26
Beverages and tobacco products	0,01	0,45	0,03	2,58	0,04	0,08	0,15
Textiles	0,02	1,85	0,19	3,9	0,42	1,31	0,51
Wearing apparel	0,05	6,41	0,02	0,1	0,69	0,48	0,26
Leather products	0,02	0,88	0,02	0,27	2,14	0,94	0,2
Wood products	0,03	1,18	0,06	3,21	0,83	2,62	3,13
Paper products, publishing	0,05	0,72	0,01	3,3	0,02	2,81	2,74
Petroleum, coal products	0,01	1,92	3,4	27,93	0,82	215,51	21,71
Chemical, rubber, plastic prods	-0,01	7,37	7,12	40,72	4,21	88,78	16,76
Mineral products nec	0	0,25	0,02	2,34	0,04	29,02	2,58
Ferrous metals	0	0,63	31,05	171,81	31,58	143,02	146,54
Metals nec	-0,06	1,05		13,2	0	1,94	6,64
Metal products	0	2,46	0,62	5,42	0,06	2,5	0,98
Motor vehicles and parts	0	1,71	0,02	1,37	0,04	0,39	0,44
Transport equipment nec	0,01	1,21	0,02	2,15	0,1	0,69	0,69
Electronic equipment	0,1	0,38	0,03	0,38	0,08	0,63	0,84
Machinery and equipment nec	0,06	1,53	0,13	38,79	1,56	8,01	6,3
Manufactures nec	0	3,98	0,07	0,26	0,07	0,3	0,08
Electricity	0	0,58	0,26	0,41	0,13	0,01	0,18
Gas manufacture, distribution	0	0		0,74	0	0	0
Water	0	0,23	0,02	0,03	0,02	0,02	0,01
Construction	0	0,33	0,02	0,15	0,62	0,18	0,13
Trade	-0,01	8,19	0,56	1,19	0,78	0,57	0,5
Transport nec	-0,03	12,87	0,84	3,31	1,56	0,93	0,94
Sea transport	0	65,82	0,15	0,1	0,92	0,35	0,26
Air transport	0	6,02	0,14	1,13	0,49	0,62	0,44
Communication	-0,01	2,66	0,19	0,42	0,46	0,69	0,33
Financial services nec	0	0,42	0,02	0,06	0,06	0,09	0,14
Insurance	0	0,28	0,01	0,04	0,03	0,07	0,12
Business services nec	-0,02	8,07	0,19	0,87	1,39	1,62	0,96
Recreation and other services	0	2,48	0,17	0,34	0,24	0,22	0,15
Public administration, defense, health, education	0	5,73	0,61	0,83	0,66	0,56	0,48
Dwellings							

Table D7: Simulated changes in the value of Ukrainian output (million US$)

	Scenario 1a	*Scenario 2a*	*Total 1a + 2a after 2013*	*Scenario 1b*	*Scenario 2b*	*Total 1b + 2b after 2013*
Paddy rice	0.060	0.000	0.060	0.195	0.051	0.246
Wheat	7.419	-0.004	7.415	191.274	80.555	271.829
Cereal grains nec	1.764	-0.002	1.762	69.868	26.783	96.651
Vegetables, fruit, nuts	-26.742	-0.001	-26.744	35.085	23.899	58.984
Oil seeds	3.105	-0.002	3.103	71.089	26.921	98.010
Sugar cane, sugar beet	1.695	0.000	1.695	6.776	2.000	8.776
Plant-based fibers	0.046	0.000	0.046	0.895	0.343	1.238
Crops nec	0.307	0.000	0.307	6.135	2.352	8.487
Cattle, sheep, goats, horses	-11.144	0.000	-11.145	-8.298	1.527	-6.771
Animal products nec	-9.278	0.000	-9.279	29.117	14.820	43.937
Raw milk	4.633	0.001	4.634	71.114	26.425	97.539
Wool, silk-worm cocoons	0.100	0.000	0.099	0.997	0.363	1.360
Forestry	-12.592	-0.001	-12.593	13.738	10.272	24.010
Fishing	-0.572	0.000	-0.571	2.114	0.987	3.100
Coal	0.243	-0.002	0.241	-2.044	-0.959	-3.003
Oil	-0.074	0.000	-0.074	-0.689	-0.253	-0.942
Gas	-0.012	0.000	-0.012	-0.118	-0.044	-0.162
Minerals nec	1.193	-0.007	1.186	-13.133	-5.933	-19.066
Meat: cattle, sheep, goats, horse	-36.426	-0.002	-36.428	12.645	18.107	30.752
Meat products nec	-58.670	0.000	-58.671	-52.579	2.311	-50.268
Vegetable oils and fats	2.487	-0.005	2.482	53.387	18.785	72.172
Dairy products	24.349	-0.004	24.346	101.612	28.583	130.195
Processed rice	2.143	0.000	2.143	6.960	1.777	8.737
Sugar	7.714	0.000	7.714	18.419	3.962	22.381
Food products nec	41.251	-0.026	41.225	114.436	27.002	141.438
Beverages and tobacco products	16.846	-0.001	16.845	61.424	16.582	78.005
Textiles	2.016	-0.003	2.013	4.332	0.709	5.041
Wearing apparel	36.045	-0.006	36.038	40.441	1.226	41.667
Leather products	18.964	-0.003	18.961	21.486	0.728	22.214
Wood products	5.198	-0.007	5.191	-4.084	-3.776	-7.860
Paper products, publishing	10.351	-0.004	10.347	8.917	-0.802	8.115
Petroleum, coal products	-2.200	-0.011	-2.211	-13.288	-4.373	-17.661
Chemical, rubber, plastic prods	-10.933	-0.038	-10.971	-73.206	-25.507	-98.713
Mineral products nec	-4.998	-0.003	-5.001	-12.920	-3.371	-16.291
Ferrous metals	11.092	-0.080	11.012	-164.914	-72.329	-237.243
Metals nec	-2.364	-0.013	-2.377	-26.326	-9.736	-36.062
Metal products	-6.313	-0.005	-6.318	-26.305	-8.177	-34.482
Motor vehicles and parts	1.291	-0.001	1.289	-4.294	-2.311	-6.605
Transport equipment nec	47.140	0.547	47.686	9.450	-14.821	-5.371
Electronic equipment	-5.405	-0.029	-5.434	-12.384	-2.875	-15.259
Machinery and equipment nec	31.212	-0.198	31.014	-34.036	-26.807	-60.843
Manufactures nec	-0.700	-0.003	-0.703	-4.616	-1.643	-6.259
Electricity	4.359	-0.084	4.275	-60.638	-27.828	-88.467
Gas manufacture, distribution	-1.572	0.001	-1.571	6.023	3.047	9.070
Water	-0.263	0.000	-0.263	0.805	0.416	1.221
Construction	55.352	0.015	55.367	87.140	12.505	99.645
Trade	8.403	0.017	8.420	50.316	16.172	66.488
Transport nec	-3.117	-0.021	-3.138	-30.730	-11.622	-42.352
Sea transport	-1.279	-0.006	-1.286	-11.109	-4.029	-15.138
Air transport	-1.033	-0.005	-1.038	-8.670	-3.144	-11.814
Communication	-1.539	0.000	-1.539	5.963	2.951	8.914
Financial services nec	2.373	0.008	2.381	-1.745	-1.922	-3.667
Insurance	-0.080	0.000	-0.080	-2.754	-1.121	-3.875
Business services nec	-1.689	-0.003	-1.692	-3.463	-1.005	-4.468
Recreation and other services	-3.460	-0.001	-3.461	-1.257	0.883	-0.374
Public administration, defense, health, education	-58.354	0.006	-58.348	-18.841	16.296	-2.546
Dwellings	0.003	0.000	0.003	0.038	0.014	0.052
Total	88.343	0.008	88.351	509.750	154.963	664.713

Table D8: Change in Ukrainian net trade in million US$ – Scenario 1a

	Paddy rice	Wheat	Cereal grains nec	Vegetables, fruit, nuts	Oil seeds	Sugar cane, sugar beet	Plant-based fibers	Crops nec	Cattle, sheep, goats, horses	Animal products nec	Raw milk	Wool, silk-worm cocoons	Forestry	Fishing	Coal	Oil	Gas	Minerals nec	Meat: cattle, sheep, goats, horse	Meat products nec
Oceania				0.10				0.02			0.01		0.04	-0.03				-0.12	0.10	0.15
East Asia		0.16		-0.17	0.07	0.01		5.12	0.01	-0.15	0.09		-2.84	0.21				-0.01	0.35	-5.20
South East Asia		0.57		0.23				6.83		0.01	0.02		0.29	-0.58					0.09	0.25
South Asia		0.09		0.33	0.10			12.44		0.01	0.01		0.54					-0.07	-2.09	0.15
North America		0.14	0.01	-2.35	0.03	0.01		3.72	0.02	0.05	0.11		-0.91	-0.05					4.39	88.89
Latin America		0.01		2.86	0.02			-25.94		0.01	0.02		-2.01	0.01				-0.06	-12.91	-134.53
EU 25		1.40	0.25	-2.49	1.04	0.02	0.01	4.73	0.34	1.50	0.30	0.03	6.80	0.41	0.03			-0.20	-47.82	109.14
Middle East and North Africa		0.76	0.98	2.05	0.08			-1.03	0.06	-0.01	0.02		-25.46	0.04	0.01			-0.04	0.24	0.35
Sub Sahara Africa		0.34		0.57	0.04			10.07		-0.48	0.01		0.84	0.02				-0.13	0.13	0.21
Russia		-0.01	0.15	-2.37	0.01			5.11	0.01	0.03	0.02	0.01	14.68	0.01	0.36	0.68	1.02	-0.20	20.05	5.55
Rest of Eastern Europe		0.02	0.08	-0.91	0.01			3.39	-0.05	0.24			0.35		0.01			0.01	0.01	6.10
Rest of Former Soviet Union				-0.05	0.01		-0.02	0.30									0.03			0.06
Armenia		0.01	0.01	0.01									0.01							0.02
Azerbaijan				-1.32				-0.70												0.03
Georgia		0.02		-0.64	-0.08			0.45					0.07					-0.01	-2.15	-0.01
Iran			0.13	10.59				0.14					0.03							
Turkey		0.05	0.08	18.51	0.37			-5.00		0.03	0.01		4.71	0.01				-0.02	0.03	0.32
Kyrgyztan				-0.11				0.33					0.06							0.01
Kazakhstan		-0.10		-0.12			-0.01	0.68							0.04	0.03		-0.02	0.03	0.01
Switzerland				0.02	0.07			0.04			0.01		0.01						0.08	0.09
Rest of EFTA				0.01				0.01			0.01		0.01	-0.04					0.03	0.07
Albania		0.02		0.02				0.72					0.01						0.01	0.01
Bulgaria			0.01	0.04				1.86	0.01				0.23		0.04			-0.01	0.06	0.15
Croatia				0.13				0.13	0.01	0.01			0.04						0.15	0.18
Romania			0.08	0.01	0.01			0.02				0.01	0.37		0.01			-0.01	0.01	0.06
Rest of Europe			0.01	0.05	0.01			0.72					0.01	0.03					0.01	0.01
Total all regions		3.47	1.82	25.02	1.78	0.03	-0.01	24.15	0.42	1.27	0.64	0.05	-2.12	0.04	0.49	0.72	1.05	-0.90	-39.18	72.07

Table D9: Change in Ukrainian net trade in million US$ – Scenario 1a (continued)

	Vegetable oils and fats	Dairy products	Processed rice	Sugar	Food products nec	Beverages and tobacco products	Textiles	Wearing apparel	Leather products	Wood products	Paper products, publishing	Petroleum, coal products	Chemical, rubber, plastic prods	Mineral products nec	Ferrous metals	Metals nec	Metal products	Motor vehicles and parts	Transport equipment nec
Oceania	0.03	-0.24	0.01	0.01	-0.19	0.02		0.03	0.02	0.01	0.03		0.06				0.01	0.04	0.03
East Asia	-1.66	2.82	0.62	0.16	-1.80	0.27	-3.13	-0.29	-0.33	-1.29	0.34	0.01	0.95	1.56	0.45	-0.30	-0.51	7.26	1.03
South East Asia	11.64		0.18	0.14	-2.43	0.04	-0.01	-0.03	0.02	0.13	0.07		-0.89	0.10	0.20	-0.03	0.06	-0.23	0.10
South Asia	0.70	1.01	0.28	0.07	-0.45	0.01	-0.15	-0.01	0.32	0.01	-0.42		1.95	0.05	0.07	-0.03	-0.02	-0.03	0.90
North America	0.02	1.18	0.07	0.08	1.25	0.21	-0.13	2.58	0.53	0.04	-1.18	0.02	1.17	-0.12	0.03	-0.19	0.39	-1.89	12.69
Latin America	16.81	0.49	0.01	1.41	1.05	0.05	0.01	0.04	0.11	0.04	0.24		-0.12		0.04	-0.01	0.02	0.12	0.22
EU 25	-8.05	10.59	0.27	1.80	24.01	2.65	-6.87	22.85	9.55	5.11	-0.22	0.18	-4.70	-0.57	-0.20	-0.90	-4.09	5.10	-0.02
Middle East and North Africa	3.86	5.22	0.56	0.02	2.38	0.07	-0.01	0.04	0.45	0.21	0.06		-3.88	0.09	0.57	-0.01	-0.05	0.93	2.29
Sub Sahara Africa	0.06	0.51	0.01	0.01	-11.18	0.04	0.01	0.02	0.01	0.03	0.04		0.11	0.03	0.05		0.01	0.03	0.42
Russia	-29.50	-15.99	0.03	0.21	29.87	4.47	-0.64	-0.14	0.28	-1.29	9.40	-0.02	2.21	-11.32	-0.82	-1.61	-0.39	-14.12	13.00
Rest of Eastern Europe	4.20	0.95	0.01	1.35	5.08	0.75	-0.01	0.01	0.16	0.30	-1.17	0.06	1.32	1.10	0.80	0.01	-1.13	-0.27	0.42
Rest of Former Soviet Union	0.14	0.49	0.02	0.08	0.93	0.07	-0.03	-0.01	0.09	0.05	0.04		0.13	0.01	0.04	-0.03	-0.01	0.23	0.58
Armenia	0.25	0.51		0.10	0.49	0.24			0.01	0.01	0.03		0.06		0.04		0.01	0.01	0.01
Azerbaijan	0.25	0.68		0.41	1.04	0.09				0.04	0.07		-0.13	0.01	0.01		-0.01	0.03	0.35
Georgia	0.66	0.49		0.37	0.75	0.49				0.03	0.07		0.02	0.01	-0.03	-0.02		0.04	0.10
Iran	1.38	0.02			-0.02	0.09					0.17		0.09	-0.02	0.09		0.01	0.03	1.09
Turkey	0.99	0.68		0.03	-0.44	0.14	-0.50	-0.09	0.02	0.43	0.20	0.01	-1.16	1.52	0.49	-0.02	-0.02	0.71	0.08
Kyrgyztan	0.03	0.07		0.04	0.30					0.01	0.02						0.01	-0.05	
Kazakhstan	0.41	1.23	0.03	0.30	3.19	0.04			0.03	0.06	0.32		0.12	0.02	0.04	-0.03	-0.01	0.18	3.28
Switzerland	3.07	0.05	0.01	0.01	0.76	0.05		0.05	0.02	0.05	0.18	0.01	-0.81	-0.83		-0.07	0.06	-0.01	0.02
Rest of EFTA	0.40	0.07	0.01	0.01	-7.73	0.01	0.01	0.23	0.04	0.02	0.03		-0.07				-0.08	0.02	0.02
Albania	0.08	0.06													0.01				
Bulgaria	-0.06	0.67		0.01	0.15	0.05	0.01		0.01	0.02	0.11	0.01	0.52	0.06	0.12	-0.03	0.04	0.01	0.04
Croatia	0.01	0.16			0.15			0.02	0.09	0.01	0.01		0.04	0.02	0.01			0.01	
Romania	0.02	0.27		0.06	0.04		-0.05	0.01	0.01	0.33	0.10	0.03	-0.15	0.07	0.06		0.04	-0.72	0.12
Rest of Europe	0.19	0.06		0.02	-0.38	0.01	-0.03	0.01	0.01	0.03	0.08		0.54	-0.12	0.04	-0.02	0.01	-0.02	0.02
Total all regions	5.92	12.02	2.10	6.68	46.80	9.86	-11.51	25.35	11.43	4.40	8.62	0.33	-2.63	-8.32	2.12	-3.31	-5.64	-2.60	36.79

Table D10: Change in Ukrainian net trade in million US$ – Scenario 1a (continued)

	Electronic equipment	Machinery and equipment nec	Manufac-tures nec	Electricity	Gas manu-facture, distribution	Water	Cons-truction	Trade	Transport nec	Sea transport	Air transport	Commun-ication	Financial services nec	Insurance	Business services nec	Recreation and other services	Pub. admin, defense, health, education	Dwellings	Total all sectors
Oceania	0.06	0.10	0.01				-0.01	-0.04	-0.07	-0.01	-0.03	-0.02	-0.01	-0.01	-0.04		0.12		0.20
East Asia	-36.68	4.15	0.72	-0.03			-0.31	-0.18	-0.33	-0.19	-0.12	-0.08	-0.05	-0.03	-0.35	-0.01	0.42		-29.25
South East Asia	4.06	0.53	0.20				-0.04	-0.04	-0.07	-0.05	-0.03	-0.02	-0.01	-0.02	-0.14		0.08		21.20
South Asia	-0.13	1.78	0.18				-0.01	-0.01	-0.02	-0.02	-0.02	-0.01		-0.01	-0.07		0.09		17.52
North America	3.44	1.14	0.03	-0.04		-0.01	-0.15	-0.20	-0.77	-0.02	-0.15	-0.14	-0.14	-0.16	-0.60	0.01	2.74		115.76
Latin America	0.75	2.93	-0.03	-0.04			-0.01	-0.03	-0.07	-0.05	-0.03	-0.02	-0.01	-0.01	-0.07		0.18		-148.52
EU 25	52.85	43.23	-0.61	-0.71	-0.01	-0.02	-0.83	-0.60	-0.99	-0.45	-0.39	-0.42	-0.32	-0.37	-2.08		1.63		221.87
Middle East and North Africa	0.75	3.49	0.02	-0.01			-0.04	-0.04	-0.07	-0.03	-0.02	-0.03	-0.01	-0.01	-0.14		0.26		-5.03
Sub Sahara Africa	-0.14	-0.09		-0.02				-0.02	-0.04	-0.01	-0.02	-0.01	-0.01	-0.01	-0.04		0.08		1.52
Russia	0.48	14.22	-1.41	-0.04			-0.04	-0.02	-0.04	-0.01	-0.01	-0.01			-0.03		0.05		41.90
Rest of Eastern Europe	-3.10	-51.81	-0.05	-0.10															-31.87
Rest of Former Soviet Union	0.05	2.16		-0.01															5.34
Armenia	-6.19	0.06																	-4.31
Azerbaijan		0.48					0.01												1.37
Georgia	0.01	0.31															0.01		0.97
Iran		0.54							-0.01										14.37
Turkey	-9.63	0.63	-0.18				-0.02	-0.01	-0.05								0.04		12.92
Kyrgyztan		0.13																	0.86
Kazakhstan	0.06	2.23													-0.01		0.01		12.02
Switzerland	-0.07	2.69	0.10	-0.01				-0.02	-0.04		-0.01	-0.02	-0.03	-0.04	-0.06		0.10		5.50
Rest of EFTA	-0.05	0.14						-0.01	-0.02	-0.09	-0.01	-0.01			-0.04		0.03		-7.01
Albania																			0.93
Bulgaria	-0.24	-9.77							-0.01						-0.01		0.01		-5.88
Croatia	0.05	0.09	0.01				-0.01		-0.01						-0.01		0.01		1.28
Romania	0.02	0.05	0.01												-0.01				0.85
Rest of Europe	0.56	0.29					-0.01												2.13
Total all regions	6.91	19.69	-1.00	-1.01	-0.03	-0.04	-1.48	-1.23	-2.63	-0.92	-0.85	-0.80	-0.62	-0.68	-3.71	-0.01	5.86		246.66

Table D11: Simulated changes in expenditure on primary and intermediate inputs in millions US$ - Scenario 1a*

Read: "Rows go as inputs to columns"	Paddy rice	Wheat	Cereal grains nec	Vegetable	Oil seeds	Sugar cane, beet	Plant-based fibers	Crops nec	Cattle, sheep, goats, horses	Animal products nec	Raw milk	Wool, silk-w.	Fore-stry	Fish.	Coal	Oil	Gas	Other Minerals	Meat: cattle, sheep, horse	Meat Prod. nec	Vege-table Oils fats	Dairy products	Proc. rice	Sugar	Food prod. nec	Bev. and tob.
Land	0.008	0.739	-0.812	-6.237	0.337	0.092	0.006	0.060	-1.183	-1.346	-0.657	0.005														
Unskilled Labor	0.018	2.221	0.877	-6.003	1.064	0.305	0.015	0.125	-1.241	-1.348	1.640	0.014	-4.530	-0.066	0.254	0.035	0.007	0.393	-2.727	-4.555	0.298	2.090	0.184	0.593	3.252	1.579
Skilled Labor		0.033	0.007	-0.112	0.016	0.005		0.002	-0.023	-0.025	0.018		-0.080	-0.001	0.007	-0.001		0.029	-0.367	-0.615	0.068	0.258	0.033	0.130	0.716	0.236
Capital	0.004	0.468	0.204	-1.193	0.225	0.064	0.003	0.026	-0.249	-0.269	0.366	0.003	-1.606	-0.082	0.001	0.066	0.013	0.463	-1.516	-2.529	0.175	1.145	0.106	0.353	1.934	0.884
Natural Resources													-4.409	-1.102	0.774	-0.051	-0.007	0.656								
Paddy rice																			-0.002	-0.002		0.001	0.044	0.001	0.004	
Wheat		1.127		-0.001					-0.307	-0.689	0.023	0.004	-0.002	-0.001					-0.405	-0.666	0.003	0.285	0.032	0.091	2.341	0.170
Cereal grains nec			-0.094	-0.001					-1.378	-3.119	-0.255	0.016	-0.002						-0.115	-0.190	0.001	0.082	0.012	0.026	0.840	0.210
Vegetables, fruit, nuts			-0.001	-1.840					-0.820	-2.049	-2.573	-0.011	-0.017	-0.004					-8.579	-2.953	-1.112	-13.849	-2.092	-2.938	-12.726	0.772
Oil seeds					0.068				-0.004	-0.009	0.004		-0.001						-0.076	-0.126	0.098	0.056	0.007	0.018	0.166	
Sugar cane, beet				-0.001		0.138				-0.001			-0.002	-0.001									0.006	1.115		
Plant-based fibers							0.004												-0.044	-0.073		0.032	0.003	0.010	0.034	
Crops nec				-0.001				-0.001	-0.154	-0.408	-0.866	-0.005	-0.001						-1.650	-0.985	-0.171	-1.920	-0.289	-0.383	-4.298	-7.550
Cattle, sheep, horse			-0.001	-0.010					-7.653	-0.003	-0.002		-0.015	-0.004					-7.215	-0.008		0.001	0.016		0.002	0.001
Animal products nec		0.004	-0.146	-1.023		-0.002		0.002	-0.003	-1.269	-0.003		-0.022	-0.006	-0.001				-0.137	-9.999	-0.008	-0.043	0.012	-0.003	-0.035	
Raw milk	0.004	0.186	-0.550	-5.251	0.119	0.061	0.001	0.016	-0.004	-0.005	-0.120		-0.028	-0.007	-0.001				-0.002	-0.003		2.753	0.046		0.002	0.002
Wool, silk-worm												0.001							-0.006	-0.009		0.004		0.001	0.004	
Forestry	-0.001	-0.051	-0.114	-0.243	-0.033	-0.032	-0.001	-0.002	-0.019	-0.018	-0.104	-0.002	-3.483	-0.004	-2.106	-0.001		-0.049	-0.077	-0.021	-0.091	-0.126	-0.018	-0.027	-0.190	-0.168
Fishing		-0.001	-0.001	-0.004					-0.001	-0.001	-0.001			-0.115					-0.083	-0.100	-0.025	-0.002	-0.002	0.003	0.003	-0.028
Coal															-0.002				-0.028	-0.044	0.001	0.017	0.001	0.006	0.030	0.012
Oil																										
Gas	0.001	0.023	0.010	-0.233	0.016	0.016		0.001	-0.022	-0.014	0.015	0.001	-0.016	-0.020		-0.005		0.008	-0.360	-0.584	0.026	0.242	0.021	0.077	0.413	0.174
Other Minerals				-0.001														0.094	-0.024	-0.038	0.002	0.016	0.001	0.005	0.027	0.011
Meat: cattle, sheep, horse	-0.001	-0.097	-0.156	-0.310	-0.054	-0.022	-0.001	-0.010	-0.049	-0.080	-0.235	-0.001	-0.001	-0.013	-0.002			-0.002	-1.796	-1.644	-1.030	-0.950	-0.165	-0.143	-1.341	-1.643
Meat products nec	-0.006	-0.802	-1.261	-2.445	-0.448	-0.181	-0.006	-0.084	-0.382	-0.634	-1.903	-0.011		-0.002					-3.064	-0.788	-3.640	-5.067	-0.716	-1.087	-7.757	-6.845
Vegetable oils, fats	-0.001	-0.119	-0.197	-0.421	-0.068	-0.027	-0.001	-0.012	-0.069	-0.111	-0.298	-0.002	-0.001	-0.006	-0.001			-0.001	-1.322	-1.293	-0.688	-0.558	-0.104	-0.072	-0.770	-1.049
Dairy products	-0.001	-0.104	-0.168	-0.346	-0.058	-0.024	-0.001	-0.011	-0.055	-0.089	-0.255	-0.001	-0.002	-0.020	-0.003	-0.001		-0.004	-2.586	-2.560	-1.311	-1.036	-0.197	-0.127	-1.415	-1.989
Processed rice			-0.003	-0.018					-0.003	-0.005	-0.004			-0.004	-0.001			-0.001	-0.485	-0.549	-0.183	-0.077	-0.022	0.005	-0.080	-0.236
Sugar		0.001	-0.003	-0.028					-0.006	-0.008	-0.004			-0.006	-0.001			-0.001	-0.666	-0.770	-0.236	-0.078	-0.027	0.014	-0.067	-0.292
Food products nec		-0.001	-0.001	-0.003					-0.021	-0.148	-1.528		-0.003	-0.032	-0.004	-0.001		-0.006	-4.622	-5.164	-1.804	-0.850	-0.225	0.018	-0.950	-2.385
Beverages & tobacco products		0.008	-0.012	-0.133	0.004	0.001		0.002	-0.027	-0.038	-0.012		-0.002	-0.025	-0.003	-0.001		-0.004	-3.415	-4.285	-0.899	0.173	-0.065	0.209	0.567	-0.826

* Inputs in rows are bought by sectors in columns. The first five rows are primary inputs; others are intermediate inputs from domestic and imported sources.

Table D12: Simulated changes in expenditure on primary and intermediate inputs in millions US$ - Scenario 1a (continued)*

Read: "Rows go as inputs to columns"	Paddy rice	Wheat	Cereal grains nec	Vegetable	Oil seeds	Sugar cane, beet	Plant-based fibers	Crops nec	Cattle, sheep, goats, horses	Animal products nec	Raw milk	Wool, silk-w.	Fore-stry	Fish.	Coal	Oil	Gas	Other Minerals	Meat: cattle, sheep, horse	Meat Prod. nec	Vege-table Oils fats	Dairy products	Proc. rice	Sugar	Food prod. nec	Bev. and tob.
Land	0.055	29.221	0.201	-10.956	11.535	-0.655	0.149	1.420	-3.131	-0.027	-6.149	0.041														
Unskilled Labor	0.066	35.905	-0.909	-15.677	14.196	-0.968	0.183	1.735	-4.327	-0.290	-9.531	0.049	0.341	-0.203	0.441	0.113	0.022	-0.170	1.471	-4.052	4.619	8.931	0.647	1.524	9.683	6.128
Skilled Labor	0.001	0.617	-0.021	-0.277	0.244	-0.017	0.003	0.030	-0.076	-0.006	-0.172	0.001	0.005	-0.004	0.024	0.019	0.003	-0.048	0.200	-0.547	1.009	1.095	0.114	0.333	2.116	0.903
Capital	0.014	7.314	-0.175	-3.178	2.892	-0.196	0.037	0.353	-0.879	-0.057	-1.926	0.010	0.125	-0.256	0.002	0.170	0.031	-0.152	0.816	-2.250	2.755	4.906	0.372	0.909	5.771	3.445
Natural Resources													-0.134	-3.266	-2.800	-0.885	-0.151	-4.230								
Paddy rice																			0.001	-0.002	0.001	0.004	0.151	0.001	0.012	
Wheat		11.643	-0.003	-0.009	0.001	-0.001			-1.873	-2.798	-8.421	-0.022	-0.003	-0.004	-0.001				0.133	-0.597	0.071	1.190	0.050	0.216	0.049	-0.793
Cereal grains nec		0.001	-4.672	-0.008		-0.001			-8.480	-13.161	-39.02	-0.111	-0.003	-0.004	-0.001				0.038	-0.170	0.021	0.341	-0.003	0.062	-0.694	-1.308
Vegetables, fruit, nuts		0.007	-0.025	-11.175	0.001	-0.004		0.002	-3.213	-5.483	-15.71	-0.055	-0.022	-0.032	-0.006			-0.002	-6.950	-2.746	-0.907	-11.107	-2.121	-2.558	-19.16	-12.53
Oil seeds		0.001	-0.001	-0.003	0.507				-0.015	-0.007	-0.038		-0.001	-0.001					0.027	-0.113	0.604	0.228	0.008	0.041	0.086	
Sugar cane, beet		0.001	-0.004	-0.010		-3.980			-0.003	-0.004	-0.011	-0.001	-0.003	-0.005	-0.001							0.001	-0.040	-1.638		-0.002
Plant-based fibers				-0.001			0.051												0.015	-0.066	0.008	0.133	0.008	0.024	0.095	
Crops nec		0.001	-0.001	-0.005				0.001	-0.222	-0.395	-1.116	-0.004	-0.001	-0.002					-0.970	-0.899	-0.085	-0.775	-0.222	-0.225	-2.673	-5.692
Cattle, sheep, horse	-0.001	-0.005	-0.038	-0.087	-0.005	-0.006			-59.280	-0.018	-0.063		-0.035	-0.045	-0.010			-0.003	-16.460	-0.007	-0.005	0.006	-0.518	0.001	-0.002	-0.029
Animal prod. nec	-0.010	0.256	-2.679	-6.687	-0.077	-0.800		0.024	-0.017	-5.987	-0.067		-0.036	-0.049	-0.010			-0.003	-0.025	-9.846	0.003	0.143	-0.448	0.022	0.072	-0.026
Raw milk	-0.042	2.830	-12.995	-33.723	0.557	-4.017	0.007	0.177	-0.023	-0.022	-4.374		-0.040	-0.057	-0.012			-0.003	-0.001	-0.003	-0.003	-4.524	-0.453		-0.002	-0.026
Wool, silk-worm												-0.009							0.002	-0.008	0.001	0.016		0.003	0.012	
Forestry	-0.001	-0.038	-0.120	-0.258	-0.028	-0.035		-0.001	-0.022	-0.019	-0.114	-0.002	-3.130	-0.010	-2.324	-0.003	-0.001	-0.118	-0.069	-0.020	-0.083	-0.116	-0.017	-0.026	-0.183	-0.166
Fishing			-0.011	-0.018		-0.002			-0.003	-0.003	-0.011			-0.613					-0.127	-0.099	-0.105	-0.117	-0.028	-0.031	-0.246	-0.265
Coal															-0.006			-0.007	0.009	-0.040	0.041	0.076	0.005	0.014	0.086	0.048
Oil																						0.001			0.001	
Gas	0.002	0.385	-0.076	-0.712	0.212	-0.076	0.004	0.019	-0.083	-0.010	-0.173	0.004	-0.001	-0.066		-0.047	-0.001	-0.086	0.125	-0.523	0.551	1.008	0.069	0.183	1.145	0.634
Other Minerals		0.005	-0.001	-0.004	0.002				-0.001		-0.002							-0.448	0.008	-0.034	0.036	0.066	0.005	0.012	0.075	0.042
Meat: cattle, sheep, horse	-0.001	-0.060	-0.167	-0.348	-0.039	-0.026		-0.005	-0.059	-0.081	-0.266	-0.001	-0.001	-0.031	-0.004	-0.001		-0.006	-0.996	-1.519	-0.293	0.132	-0.166	-0.065	-0.828	-1.640
Meat products nec	-0.006	-0.652	-1.285	-2.552	-0.383	-0.193	-0.005	-0.064	-0.414	-0.630	-1.989	-0.010		-0.003				-0.001	-2.731	-0.745	-3.283	-4.547	-0.685	-1.016	-7.272	-6.547
Vegetable oils, fats	-0.001	0.007	-0.219	-0.517	-0.013	-0.037		0.005	-0.097	-0.109	-0.376	-0.001		-0.015	-0.001			-0.002	-0.462	-1.177	0.204	0.740	-0.046	0.085	0.302	-0.481
Dairy products	-0.001	-0.037	-0.186	-0.409	-0.030	-0.030		-0.001	-0.072	-0.090	-0.306	-0.001	-0.001	-0.043	-0.005	-0.001		-0.007	-1.040	-2.343	0.235	1.231	-0.123	0.116	0.233	-1.268
Processed rice		0.031	-0.010	-0.044	0.013	-0.003		0.004	-0.011	-0.005	-0.025			-0.009	-0.001			-0.002	-0.137	-0.500	0.168	0.436	-0.003	0.062	0.309	-0.053
Sugar		0.055	-0.015	-0.073	0.023	-0.005		0.008	-0.018	-0.008	-0.041			-0.012	-0.001			-0.002	-0.188	-0.703	0.243	0.622	-0.004	0.090	0.449	-0.063
Food products nec		0.003	-0.001	-0.005	0.001	-0.001			-0.056	-0.181	-3.101		-0.001	-0.067	-0.008	-0.001		-0.011	-1.178	-4.698	1.736	4.325	-0.002	0.631	3.247	-0.212
Beverages & tobacco products		0.287	-0.073	-0.366	0.124	-0.023	0.002	0.041	-0.091	-0.037	-0.200	0.001	-0.001	-0.060	-0.007	-0.001		-0.010	-0.667	-3.904	1.878	4.235	0.083	0.662	3.653	0.627

* Inputs in rows are bought by sectors in columns. The first five rows are primary inputs; others are intermediate inputs from domestic and imported sources.